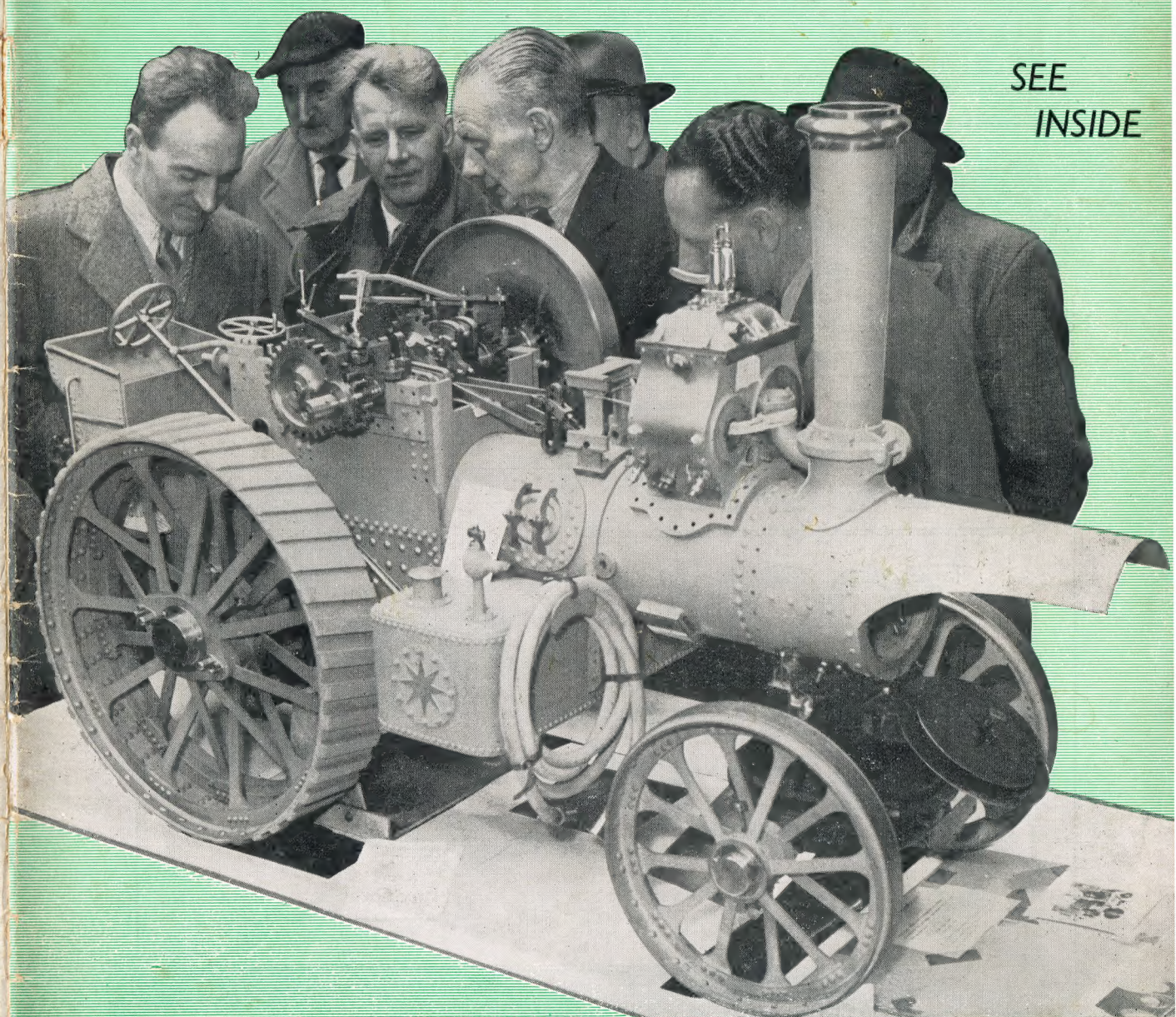
Bittle

Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

Northern models exhibition



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ONE SHILLING 25 APRIL 1957 VOL 116 NO 2918

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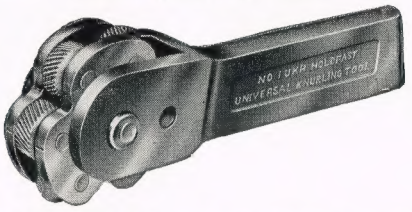

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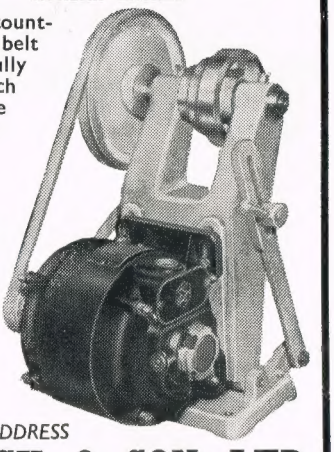

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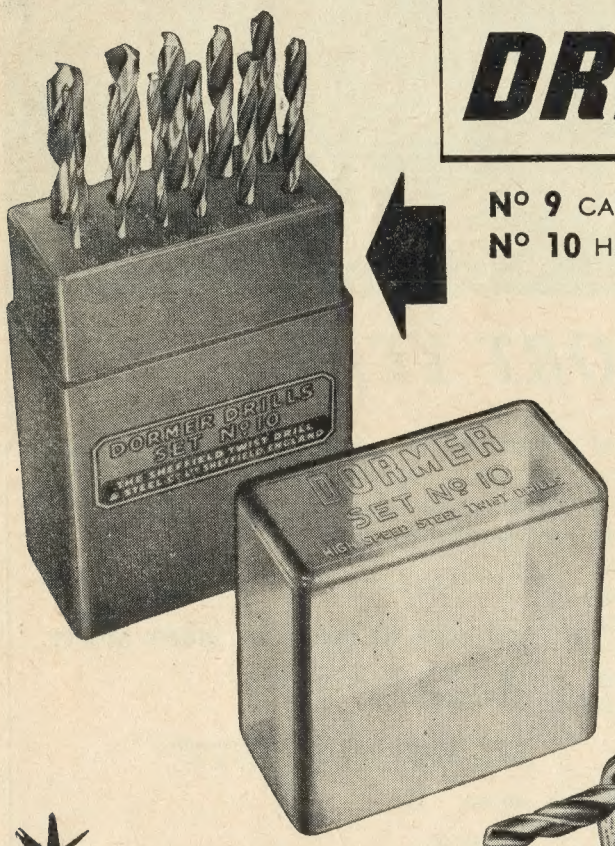

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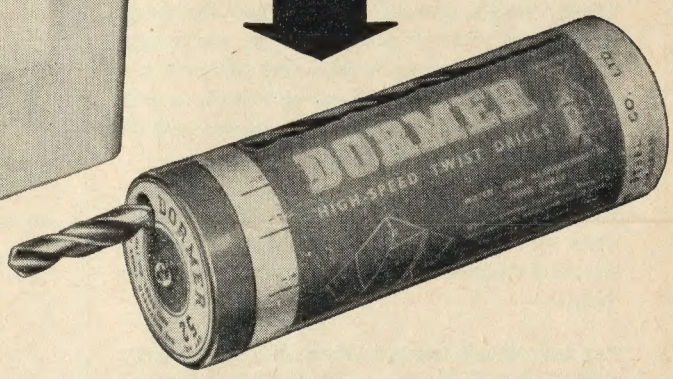

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Model Engineer

25 APRIL 1957 VOLUME 116 No 2918

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IN THIS ISSUE

589 **Smoke rings**
591 **Vanessa—part 2**
595 **Beginner's workshop**
596 **Model 18-pounder—part 2**
599 **Steam-engines in Lincs**
600 **Power boat steam plants**
603 **Cutting small screws**
604 **Traction-engine topics**
606 **50 years ago**
608 **L.B.S.C.**
611 **Northern Models Exhibition**
614 **Expert's workshop**
616 **Craftsmanship in school**
618 **Postbag**
622 **Readers' queries**
623 **Club news**

NEXT WEEK

Oil-firing steamboats

50 years of modelling: A model engineer reviews some of the highlights of his lifetime's hobby

Chingford Exhibition: There is still plenty to delight the live-steamer

Curve location: A new method of locating track arcs when the "compass" method is impracticable

All correspondence should be addressed to the Editor, Model Engineer, 19-20, Noel Street, London, W.1.

Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

MR S. A. WALTER, who contributes the article in this issue on the model 18-pounder gun, is a very gifted and versatile engineer. A Londoner, he is a Chartered Mechanical Engineer, a member of the High-speed Flight Association and, at present, technical manager to a firm manufacturing automobile accessories.

All his life he has been keenly interested in model engineering, which he began to practise seriously in 1937, and he has given readers of this journal the benefit of his years of experience with several highly-informative articles, mostly on guns or fire-engines.

His models have won several silver and bronze medals at Model Engineer exhibitions, and in addition he has been awarded two Malden silver medals of merit, and numerous other trophies in the Harrow and Wembley S.M.E., and elsewhere. A model Leyland fire-engine and Bayley escape built by Mr Walter are on permanent exhibition at the Science Museum, South Kensington.

Mr S. A. Walter

Varied hobbies

His work with the societies extends to practical domestic issues, and he has been treasurer of the Harrow and Wembley club since 1946. He has his own small model engineering workshop at home.

Versatile in his engineering practice, he also displays a variety of tastes in his hobbies. Among other interests he finds time to enjoy woodturning, collecting and drawing. He is the author of *Make Your Own Microscope.*

Theory and practice

INDUSTRIALISTS are coming to realise the value of correlating theory and practice. Experiments conducted with students and apprentices have shown that the assimilation of knowledge and the acquisition of skill develop much more rapidly under a correlated system than when the two departments of learning are segregated.

Smoke Rings . . .

This is a view which I have previously put forward, for I hold the old-fashioned notion that an ounce of practice is worth a ton of theory. It is only by experience that we learn, and practice, after all, is nothing more than practical experience.

Yet, in this modern age the academic issues are important, for the successful engineer must not only be able to demonstrate his manual skill but he must also be capable of understanding why certain practices are desirable and others are not. In this way is created what the Greeks described as the "all-round man."

Benefits to both

Under earlier training schemes little or no heed was given to the question of relating theory and practice. The usual policy was to cram the student with facts and figures for a few years and then let him loose in the machine shop, probably under a foreman or works manager who, though essentially skilled in his craft, possessed little, if any, scholastic knowledge. The result of this was the creation of a psychological bridge which embarrassed both apprentice and foreman.

But with modern techniques progress in practical and theoretical fields is simultaneous, with great benefits to pupil and tutor.

By the correlated method of teaching—or the sandwich system as is also adopted by some concerns—the foreman is kept abreast of the latest technical advances at college and the student learns at an early date to master the intricacies of the machine.

What has this to do with model engineering? Well, I like to feel that this is a system which has been practised all the while by model engineers and that in its functioning this journal has played no small role.

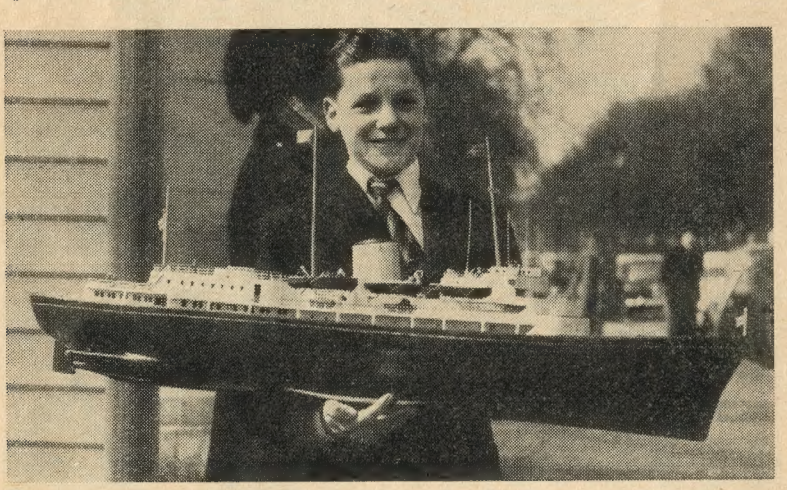
On pages 616 and 617 Britannicus discusses an interesting educational experiment in this field.

Called to Palace

THERE is no knowing where one's model engineering might lead one. For 14-year-old John Dennys, who has several fine ship models to his credit, it led him to Buckingham Palace.

John has made a 4 ft model of the Royal Yacht *Britannia* which he frequently sails on the famous Round Pond in Kensington Gardens. It attracted the attention of a newspaper photographer and Prince Philip saw its picture when the paper published the story. The Prince expressed the desire to see the model so John took his boat to Buckingham Palace.

The *Britannia* cost him £5 to build, which sum of money he earned by doing a paper round—all of which goes to show just how important newspapers can be in the life of a young model engineer.



John Dennys with his model of the Royal Yacht BRITANNIA

Living in the past

ONE of the most monotonous criticisms of model engineers generally, and of this journal in respect of the type of articles published, is that we are "living in the past" and that we would do better to forget about old locomotives, ancient ships and other historical lumber, and get on with modelling up-to-date or even futuristic subjects.

I have replied to this several times in the past, but it crops up with such regularity that some further comment on the matter will not be out of place.

Model engineering has many facets and many aims, but its exponents are in nearly all cases inspired by a love of mechanical devices and mechanical craftsmanship. They are individualists, too, and find satisfaction only in results achieved by their own efforts and initiative.

Lacking in romance

In this respect they have much in common with the pioneers of a past age, whose works give much more scope for both the exercise and exhibition of craftsmanship than the majority of modern engineering products. There is not only beauty in the structure, but also majesty in the motion, of an old-time beam engine or steam locomotive which cannot be found in their more efficient but less romantic descendants.

Many model engineers pursue high efficiency in experimental models of various kinds, and often lead the way to improvements in full-size engines and machines; but many of the modern developments in engineering are impossible to reproduce as small scale *working* models, even if there were any practical incentive to do so.

Scope and achievement

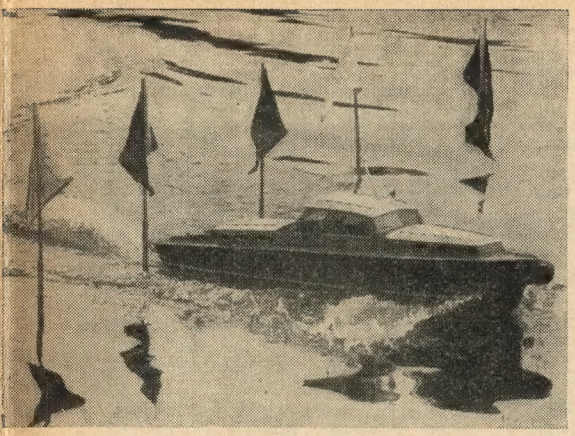
Many static or "representational" models of the most advanced modern engineering devices have been constructed, and undoubtedly give a good deal of scope for ingenuity, but their appeal is to the eye only, and most readers will agree that "live" models are generally more attractive, if only for the satisfaction achieved in solving the practical problems which they present.

One of our readers recently remarked that "we are living in an age of electronics, gas turbines, rockets, solar energy, space travel, diesel electrics, and a host of other scientific wonders."

All this is perfectly true, but how many of these things give as much scope for real amateur craftsmanship as a humble traction engine or a grandfather clock?

Cover picture

Mr L. G. Formilli has been 10 *years building this* 3 *in. scale showman's engine, which is now nearing completion. It was one of the big attractions at the Northern Models Exhibition, about which Joseph Martin writes on pages* 612 *and* 613.



VANESSA

A radio-controlled model power boat

Engine cooling, underwater gear and the method of radio control are discussed by R. H. R. CURWEN in the second article of this short series on his boat

Continued from 11 April 1957, pages 519 to 521

IGNITION GEAR AND GENERATOR EXPERIMENTS

WHEN the boat was launched in 1951 ignition was by coil, energised by a 2 v. accumulator; but I dislike accumulators of any kind, due to the frequent maintenance which they demand during the boating season and the attention which they require, but do not always receive, during the winter months.

The next scheme consisted of a magneto for ignition and a generator to provide the necessary power to operate the steering motor.

Both the magneto and generator were driven through a 2-1 ratio gearbox. Fig. 7 shows the general arrangement of the complete unit which was mounted just forward of the engine and driven from the crankshaft through a short cardan shaft.

The box, which is sectioned in Fig. 8, was machined from duralumin and houses the three gears which are of 1 in. and ½ in. p.c.d. and 40 d.p.

Any of the small permanent magnet motors will act as d.c. generators, and there are two Government surplus types, originally fitted with centrifugal fans for the cooling of radio valves, I believe, which have a surprisingly high output when driven at speed.

The type which gave the best output on test was rated at 24 v. It is 2 in. long by 1¼ in. dia. and it can be identified in the stores by the four tapped holes (6 B.A.) on the outside of the casing near the drive end by which it can be fixed in a socket mounting.

These little motors are beautifully made and are fitted with nine-pole armatures running in ball-races. They are still obtainable from the various electrical surplus shops at a cheap price.

The reasons for running at double the engine speed were as follow. First, to ensure that the sparks provided by the two-pole magneto (two per revolution of the engine) would be of like polarity, for the reason that I mentioned in my letter which was published in MODEL ENGINEER for 3 September 1953; and which is still a mystery.

Secondly because the generator must not be run below 2,000 r.p.m. in order to drive the steering motor, though, of course, less power is needed to move the rudder when the boat is travelling at slow speed. At full speed, however, the generator output was so high—approximately 0.2 amp. at 20 v.—that a governor had to be fitted to the steering motor in order to keep the rate of steering under control.

The unit was quite successful and the boat could be run for steering only with no batteries on board other than the l.t. and h.t. for the radio.

The output of the generator would, of course, be quite sufficient to charge an accumulator to enable a constant voltage to be available for the various auxiliaries, and also for coil ignition if required: but in the interest of weight-saving, experiments are proceeding with other forms of voltage control. There is scope for much interesting experiment here.

In cold weather I found some difficulty in turning over the engine at a sufficient rate to obtain a good spark from the magneto for starting purposes; but this trouble was cured by switching a small 1½ v. dry cell into the primary circuit of the coil, as in the diagram, Fig. 9.

Needless to say, the cell must be connected so as to boost the primary current and not to oppose it, and it should be switched out of circuit as soon as the engine is running. Of course, generators and magnetos absorb engine power and will reduce the speed of a boat, but the weight of batteries which can be saved by their use will to some extent offset any loss of performance on the water.

Experiments have also been made in order to reduce the battery drain when coil ignition is in use; and by fitting an "economy" cam to the contact breaker the mean current has been reduced to the low figure of 0.25 amp. This cam reduces the period of make to about 40 deg. of crankshaft rotation and allows the engine to be run for several hours from a 12 oz. 4½ v. dry battery of the bell or handlamp type.

The minimum permissible period of make is dependent upon the battery voltage and the efficiency of the coil, and also upon the maximum engine speed required; but there is no doubt that in many power plants the battery life could be greatly prolonged by attention to this detail.

ENGINE COOLING SYSTEM

The standard centrifugal pump, *a*, is fitted at the lower end of the vertical shaft, circulating the cooling water round a closed circuit as shown in the diagram, Fig. 10. The system is filled through the vented cap on the small header tank, *b*, which is mounted and piped up to the engine as shown to allow the flow to be assisted by thermo-syphonic action.

Under the keel is fixed the cooler, *c*, which consists of a 12 in. length of ½ in. dia. copper tube, closed fore and aft by streamlined caps. After fur had caused a partial blockage of the water passages between the block and the cylinder head, I fitted the more usual system in which the water is picked up by an open tube fixed in the slip stream and flows overboard after passing through the engine.

But to allow running on salt water without damage which would undoubtedly occur through corrosion, I have reverted to the original closed circuit in which I now use distilled water.

The engine is at its best when run at near boiling point and would probably benefit by the use of glycol as a coolant to allow of a still higher temperature.

VANESSA . . .

UNDERWATER GEAR

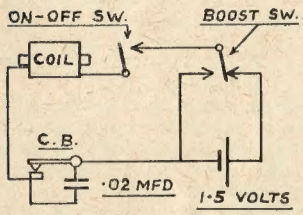
The drawing, Fig. 11, shows *Vanessa's* shaft bracket (which is V-form) and also the propeller and rudder. After a number of trials, the best results were obtained with a propeller of 2½ in. dia. × 2¼ in. pitch, made from hard brass with the blades attached by Easiflo silver solder.

The propeller is fitted to the shaft by means of a split collet similar to that on the inboard end, as already detailed in the drawing of the clutch, Fig. 2—a method of fixing which has no doubt prevented its loss in spite of damage sustained from time to time from impact with submerged obstructions.

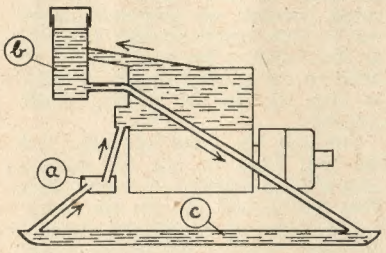
An amazing variety of articles ranging from old bicycles to buckets find their way into the local pond at times; but it would be selfish to grumble about all the little "boats" each consisting of a small stick to which is attached a foot or two of string, and which, presumably, are considered expendable by their youthful skippers.

For efficient steering under radio control the rudder should be mounted close behind the propeller, and it should be of sufficient area to deflect part of the slip stream. It must also be properly balanced by having from 25 per cent. to 30 per cent. of its area ahead of its axis; but if more than this proportion is used the rudder will lock over on full helm and require a lot of power to shift it.

It is worth while to disconnect the tiller from the rudder servo gear and to make a few experiments on a trial rudder with a pair of snips. With a high powered boat these trials are best carried out at the pondside and not in the bath, for obvious reasons.

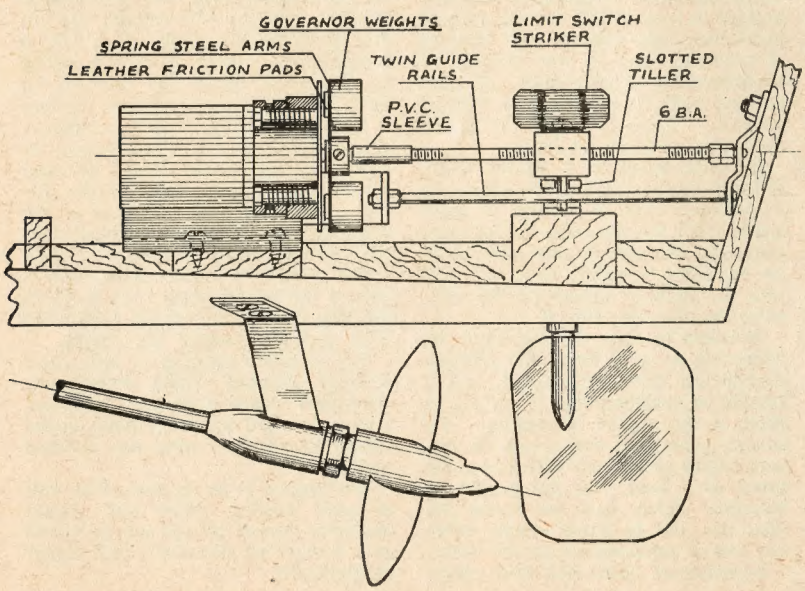


Above, Fig. 9: Method of boosting spark by introducing dry battery



Right, Fig. 10: Engine cooling system

Below, Fig. 11: Showing the prop shaft anchorage and steering unit



Further trials were carried out in collaboration with Graham Caird (I forgave him after the return of that lining brush) and we found that rudder depth has an important effect on the performance of these planing types of hulls when turning at high speed. Graham's boat is of similar hull form to *Vanessa* and has a spectacular performance of about 15 m.p.h.

Using deep rudders to cover the larger proportion of the disc areas of our propellers, we soon found that on applying full helm of about 33 deg. our hulls would heel inwards most viciously, digging in at the bow and lifting almost clear at the stern—a most unseaworthy manoeuvre, quite different from the gracefully banked turns of which these hulls are capable when planing.

Adjusting the rudders

For good manoeuvrability at low speed we found that 33 deg. of helm was about the minimum necessary, and, therefore, the lower parts of our rudders were cut off bit by bit until the trouble was cured.

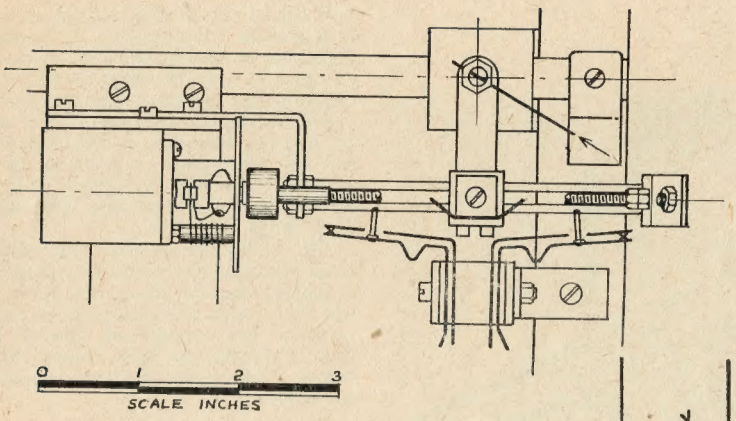
This angle of heel is caused mainly by the turning moment exerted upon the hull in the vertical plane by the rudder, which for a given degree of helm will be proportional to the length of the rudder and its distance from the hull; it is obvious that as the heel increases so the rudder acts more as an elevator and less as a device for steering the ship.

No doubt the requirements for success in straight-running steering events are large rudders, fixed fins, or both of these; but with a fair turn of speed, and unassisted by such aids to navigation, *Vanessa* is capable of scoring a bull on occasion. After the radio control has been in use, and to avoid the necessary resetting for straight running by the trial and error method, a pointer and scale have been fitted to the top of the rudder stock.

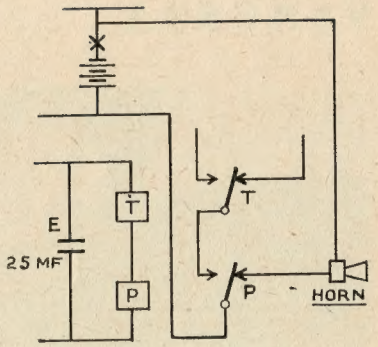
RADIO CONTROL SYSTEMS

Vanessa was first fitted with a soft valve receiver using a Hivac XFG.1 valve in a standard super-regenerative circuit. This receiver was extremely sensitive and easy to tune, but suffered from the need to have a turn or two removed from the coil at fairly frequent intervals to allow the circuit to be kept in its quenched (sensitive) condition when tuned to the 27 m/cs band.

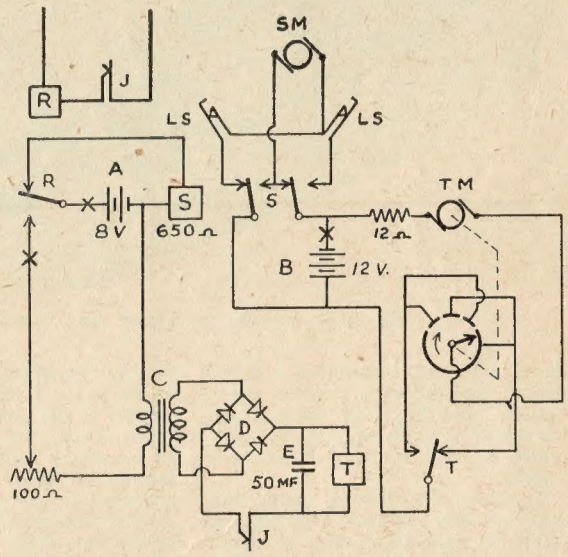
The characteristics of the soft valve are continually changing when in use due to the absorption of the gas (a minute quantity of which is introduced in manufacture) by the electrodes; and logs which I have kept of the use of two of these valves, run under



Above, left, Fig. 12: The layout of the steering unit



Above, right, Fig. 14: Details for a third control



Right, Fig. 13: Diagram for the intergear wiring

normal conditions with a mean anode standing current of 1.5 ma, and pulsed on the mark-space system, show that their useful lives ended after 12 and 15 hours respectively.

With the advent of the transistor (now, incidentally, obtainable at 10s.) there are signs that the soft valve will be more popular, as its life is greatly extended when passing a low current of say 0.25 ma, which can be amplified by the transistor to several milliamps to operate a relay.

In 1952 a hard valve (3S4) super-regenerative receiver, named the Ivy after its designer, Mr Ives, was built and installed. It gave trouble-free use for four years. These, and many other circuits, have been published in the interesting bulletins issued by the International Radio Controlled Models Society and are still available to members in pamphlet form.

On my receivers I have always used Sigma relays wound to 5,000 ohm which, when properly adjusted, will operate without fail on a current change of 0.1 milliamps or less; but although these, which could be obtained for a few bob some years ago, are no longer available there are a number of good relays now on the market from which one may choose.

Of the ex-Government types, there is a robust and sensitive 5,000 ohm relay supplied by Mr A. T. Sallis of Brighton, and also the Siemens high-speed type which is obtainable with coils wound to various resistances up to 3,400 ohm which has a degree of sensitivity to suit receivers of most types.

Among those produced especially for radio control should be mentioned the range of particularly neat little relays recently introduced by RipMax Ltd; and also two miniature models, one of polarised type, manufactured by E.D. Ltd. But a sensitive relay of any type, unless treated and adjusted with the greatest care, can be the cause of more trouble than any other item of the control gear.

A simple transmitter, using a pair of 3S4 valves connected in push-pull, was powered by dry batteries and gave a maximum range of about 200 yards with a current drain of only 15 ma from the 90 v. h.t. battery.

Pulse modulation of the transmitter carrier wave was (and still is) carried out by means of a pulser unit (which will be described later), the steering being progressively controlled on the well-known mark space system at a pulse frequency of approximately 250 per min., which is increased to 750 for control of the engine throttle.

With this system at least one further control can be added, if desired, to function at a pulse frequency of, say, 1,000 per min. For the 1956 season, with a view to enjoying the added pleasures of simultaneous operation without interference, a four-valve superhet receiver was built to the design by D. McQue, and it was used throughout the season with complete reliability; though I was disappointed to have only one opportunity of sharing the pond with an enthusiast similarly equipped.

Both the transmitter and the local oscillator in the reciever are crystal controlled, and a remarkable degree of stability is achieved by this outfit.

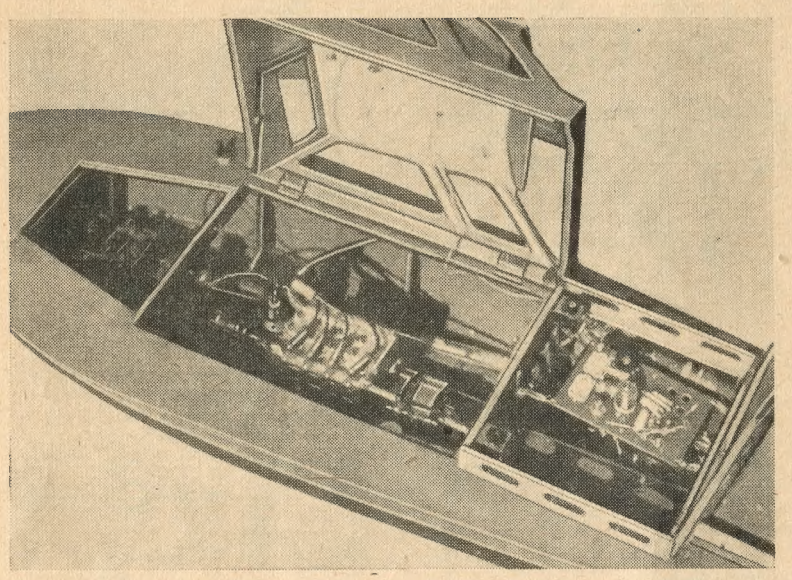
INTERGEAR SYSTEM

The complete wiring diagram of the electrical gear carried by *Vanessa*, from the anode relay onwards, is shown in Fig. 13, and works as follows.

The anode relay, *R*, fitted to the receiver is of the single-pole two-way type and is connected to operate a secondary relay of 650 ohms, *S*, which being fitted with double-pole change-over contacts reverses the steering motor, *SM*, on the receipt of each pulse.

Limit switches, *LS*, are fitted to disconnect the steering motor when full helm is reached by the rudder to either port or starboard. Three four oz. $4\frac{1}{2}$ v. flashlamp batteries, *B*, connected in series, power both the steering and the throttle motor, *TM*, and two batteries of similar type, *A*, provide 9 v. to energise the steering relay, *S*.

At this point perhaps I should explain for the benefit of those who are new to the game that the period



The cabin upended to display the "works"

during which the transmitter is keyed on by the pulser is known as a "mark," and the pause during which the carrier wave is off and the transmitter is dead is referred to as a "space."

Therefore the steering motor will only oscillate without moving the rudder so long as a series of marks and spaces of equal length are received by the ship. Now if the mark space ratio is varied, by making the marks of slightly longer duration than the spaces, the rudder will be moved slowly in one direction, and the reverse will occur if the spaces are lengthened and the marks shortened.

It can be seen, therefore, that the rudder can be moved either to port or starboard at a rate which is determined by the mark space ratio received, and that by this method a fine degree of control can be obtained.

The general arrangement of the steering gear, which follows normal screw and nut practice, is shown in Figs 11 and 12, the motor being a miniature Delco of ex-Government origin rated at 27.5 v. It has power to spare with a current consumption of 120 milliamps.

The friction plate upon which the governor pads rub is attached to the end face of the motor by two screws, and the limit switches, shaped as shown from G.P.O. relay contacts, are mounted on an L-bracket level with the striker plate which is screwed to the top of the nut.

To operate the second channel, a step-up trnasformer, *C*, is connected as shown to receive pulses of direct current at the same rate as the mark space signal, and it produces across its secondary winding an alternating voltage of mean value roughly proportional to the pulse frequency.

After passing through the five ma bridge-connected rectifier, *D*, and being smoothed by the 50 mfd capacitor, *E*, the resulting direct current is used to operate the sensitive relay, *T*, which is wound to 5,000 ohms.

This d.c. is adjusted by the 100 ohm variable resistance in the transformer primary circuit to a value of approximately ½ ma at the steering pulse rate of 250 per min., and rises to 1½ ma. to close the relay on receipt of a signal pulsed at the rate of 750 per min.

The mark space ratio of the latter is set at 50-50 in order to ensure that no rudder movement shall take place while the throttle control is in use.

Jacks, *J*, are connected both in the receiver anode and the throttle relay circuits for the insertion of a five ma. meter when tuning and checking, and the jack plug is rigidly fitted to the back of this meter for convenience in use.

As already mentioned, a further control can be added to operate, say, a horn. To achieve this an additional sensitive relay, *P*, is connected as in the diagram, Fig. 14, and adjusted to pull in at a current of about two ma., which can be obtained from a signal pulsed at a rate of 1,000 per min.

On receipt of this signal, relay *T* will also close; but the throttle motor is prevented from starting by having its circuit broken by the back contact of relay, *P*, and the relay contacts are shown in this condition in the diagram.

The receiver is mounted above its l.t. and h.t. batteries on rubber pads, but all other gear is grouped into suitable boxes, rigidly screwed to the hull timbers and fixed not less than ½ in. above bilge level.

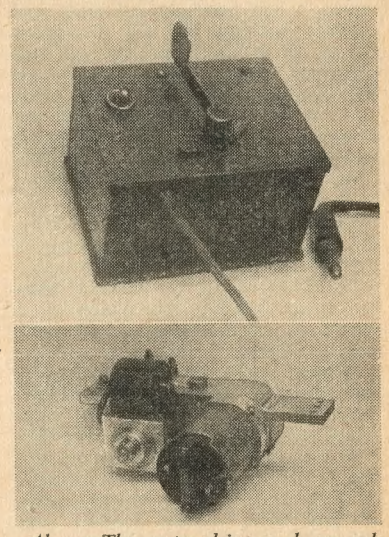
All wiring is carried out with p.v.c. insulated flex, which for neatness is twisted into the form of a harness and fitted with plugs and sockets for most of the connections, though I find it difficult to keep things tidy below deck when changes of gear are made.

Bought from a barrow

The secondary relay, *S*, is a miniature ex-Government type, still available for a few shillings, but one with a lower resistance coil can, of course, be used here and tapped off battery, *A*, at a lower voltage if desired. The small transformer was picked up from a barrow in Farringdon Road, London, for the sum of 1s. 6d. It has a ratio of about 1 to 18, with a primary resistance of 10 ohms and a secondary of 800 ohms, but these values are not critical.

The rectifier was removed from a meter which formed part of a microphone tester obtained from the same barrow, and is probably of 5 ma. rating; and the meter, which was found to have a full scale deflection of 500 micro-amps, was built into a wave-meter with which the frequency of my transmitters can be checked before use.

To be concluded



Above: The motor-driven pulser used for the control of VANESSA, *and, below it, the generator-magneto unit*

By Geometer

BEGINNER'S WORKSHOP

SIMPLE FORM TURNING

FEEDS of cross-slide, topslide and saddle provide for ordinary facing and turning operations, while small irregular features can be machined with form tools, and radius tools or radius-turning attachments enable regular radii to be produced.

There remain, however, larger forms which none of these processes properly cover, since there is a limit to the size a form tool can be made—apart from the chatter which occurs with a broad cut. For machining to be smooth and clean, the single-point tool principle must be adopted, and this means the tool must be guided in some manner, whether the cut is to be over the end of a piece of work or along the side.

At *A* is shown how a conical end can be provided on work by setting the topslide at an angle, for the line, *X-X* to be produced with the slide travelling along *Y-Y*. If, however, it is necessary to finish the work with a curved end, the method shown at *B* is about the simplest that can be contrived.

It might in some circumstances, of course, be possible to machine the work free-hand to a plate gauge; and again, on occasion, a radius turning attachment might be used—if the curve is a proper radius and not too large.

The method shown employs a sliding tool in a holder mounted on the topslide in the normal manner. A collar is attached to the rear end of the tool against which bears a spring to keep the tool in contact with a form plate. This plate is mounted on a pad centre in the tailstock, and a cut is applied to the tool by tailstock feed. Ordinary cross-slide feed then carries the tool over the work.

In any type of form turning, the form plate should provide a solid backing for the tool and be capable of feed so the tool can be advanced to the work for succeeding cuts. Here, this is conveniently done from the tailstock. The plate can be of angle iron held by screws or bolts to the pad centre—or mounted in any other convenient manner, such as by brazing it to a taper shank.

The required profile can be marked, then with the surplus metal sawn away, it can be filed and scraped to a finish for the rear end of the tool to slide smoothly over it—with a drop of oil. Too great a movement should not be attempted for the tool.

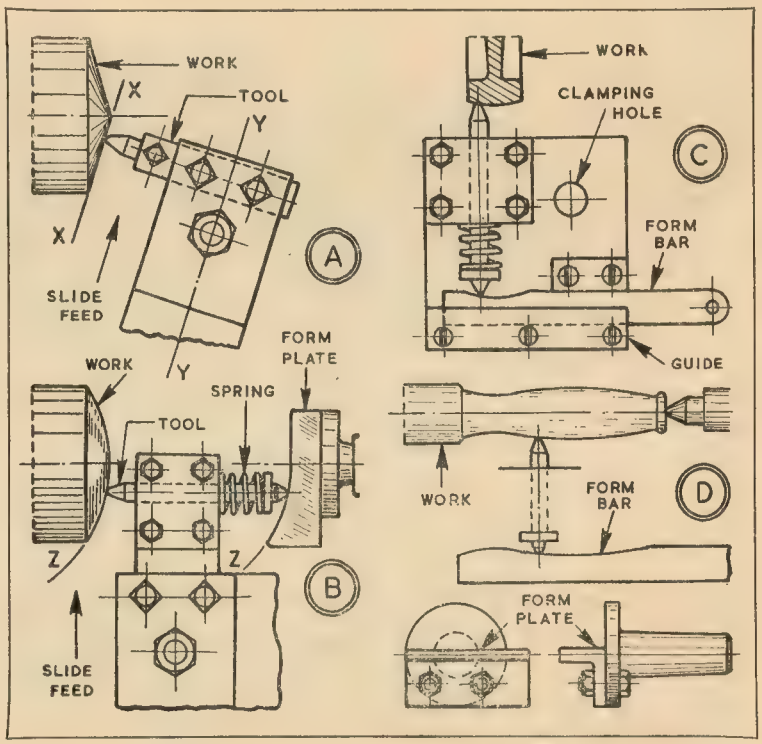
The above provides for machining a curved crown on a piston, or for finishing the outside of a shallow bowl—the inside being turned with a form plate of opposite shape. For tool application to the side of work, such as for crowning a pulley or flywheel rim, or machining handles, candlesticks or shaped table legs, the principle is the same and a tool set-up can be made as at *C*.

A similar type of spring-loaded sliding tool is used with the rear end bearing on a form bar carrying the profile. The form bar is backed by a guide in which it is free to slide, and the whole is mounted on a piece of flat steel plate which has a clamping hole to fit over the stud of the top-slide for holding down with a distance piece and nut.

The form bar has a hole at the end for attachment to a link, which is itself fixed to a bracket on the end of the lathe, or a wall at the end—the principle being to hold the form bar from movement endwise but permit the cross-slide to be fed in to apply the tool to the work.

By altering the form bar, as at *D*, long curves can be machined, as are necessary on work of the type mentioned. For end work of the type at *B*, the tool mounting must be at right-angles, and the form bar anchored at the back of the lathe.

The form plate mounting on the tailstock pad centre for *B* is shown in the bottom diagram. ▣



A MODEL 18-POUNDER FIELD GUN

This is the first of two articles in which S. A. WALTER will describe a model which makes a welcome change to the general run

FOR A NUMBER OF YEARS I have been interested in model ordnance and artillery, for several reasons. Guns are a complete change from the locomotives, ships and engines that are more generally modelled; they provide excellent opportunities for good workmanship and presentation; they are interesting to make, especially as one side of a gun usually differs entirely from the other, thus reducing duplication of parts to a considerable extent; they are interesting mechanically; and they may be constructed, in reasonable scales, with quite a small lathe.

Finally, details are not always easy to obtain which, in my own case, at any rate, is an added inducement, as I have always enjoyed examining old records for authentic and reliable data.

In the case of the 18-pdr, the search for the necessary information extended over a considerable period. Through the courtesy of a friend, however, I was fortunate in borrowing a copy of the original handbook on the gun, but although this contained data about the construction, illustrations were few and not very good, and were insufficient to provide enough details for a reasonable model.

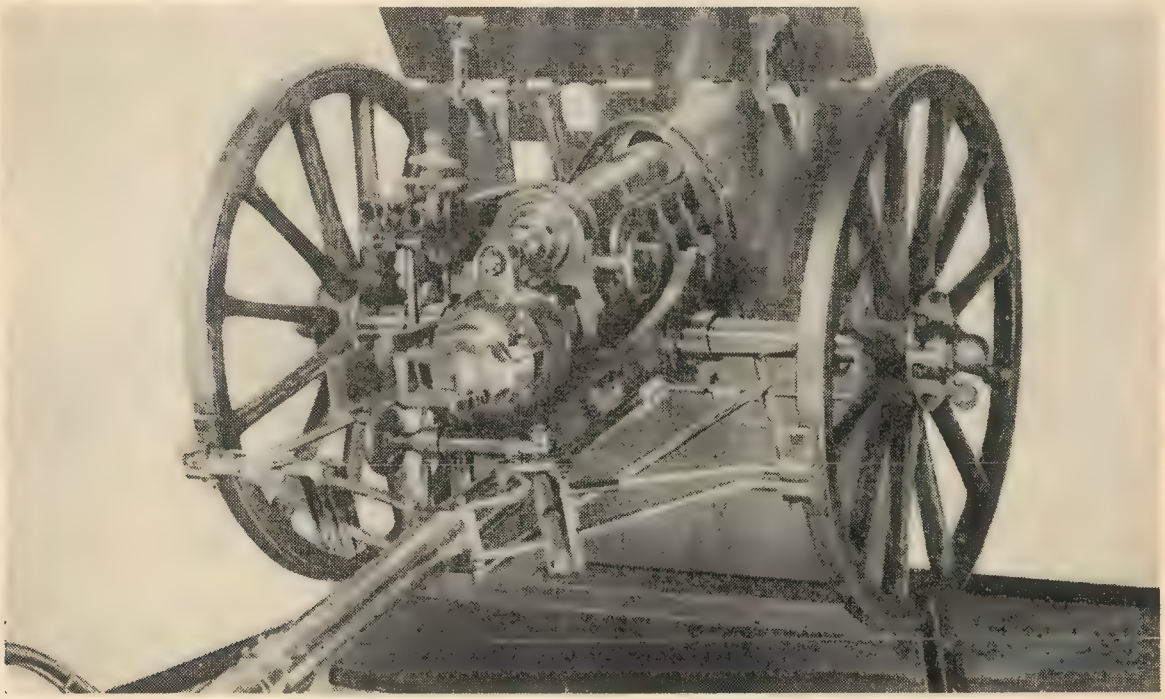
Then, one day, from the top of a bus, I saw an actual 18-pdr. standing on the parade ground of the local Sea Cadets. It was complete except for the sights, but of a later type than the one I wanted, having pneumatic tyres instead of steel-tyred wooden artillery wheels. In other respects it appeared to be the same.

A telephone call to the commanding officer brought ready permission to visit the gun and take whatever details I required. This I did, making numerous sketches and taking some photographs.

The prototype was originally developed from the famous French 75 prior to the first world war. In the British gun, the bore was enlarged to 3 in., and various other modifications were made at the same time. The gun was one of the best-known pieces of British artillery during the 1914-18 war (in a modern version, it was also used in the 1939 war). It was officially known as the 18-pdr Mk 1 Q.F. gun, Land Service.

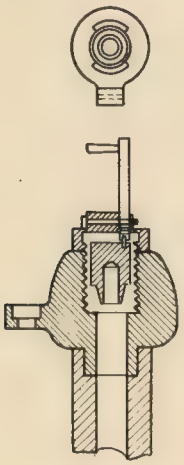
The scale of the model was dictated by the happy fact that I possessed a short length of 0.300 in. bore rifled barrel, which was just one-tenth the calibre of the prototype—so, there was nothing more to be said.

The leading details of the completed model are: calibre 0.300 in.; overall length (muzzle to end of traversing



lever) 18¼ in.; overall length of barrel and breech 9½ in.; diameter of wheels over tyres 5⅝ in.; total width over hubcaps 8 in.; height (ground to top of shield) 6¾ in.; recoil 4 in.; maximum elevation 16 deg.; maximum depression 5 deg.; and maximum traverse (total) 8 deg.

One-tenth full size was a very convenient scale for my equipment, which includes a modified 2½ in. G.A. instrument lathe with the centres raised by packing blocks to 3½ in. The maximum length admitted between centres is 10 in., and the drive

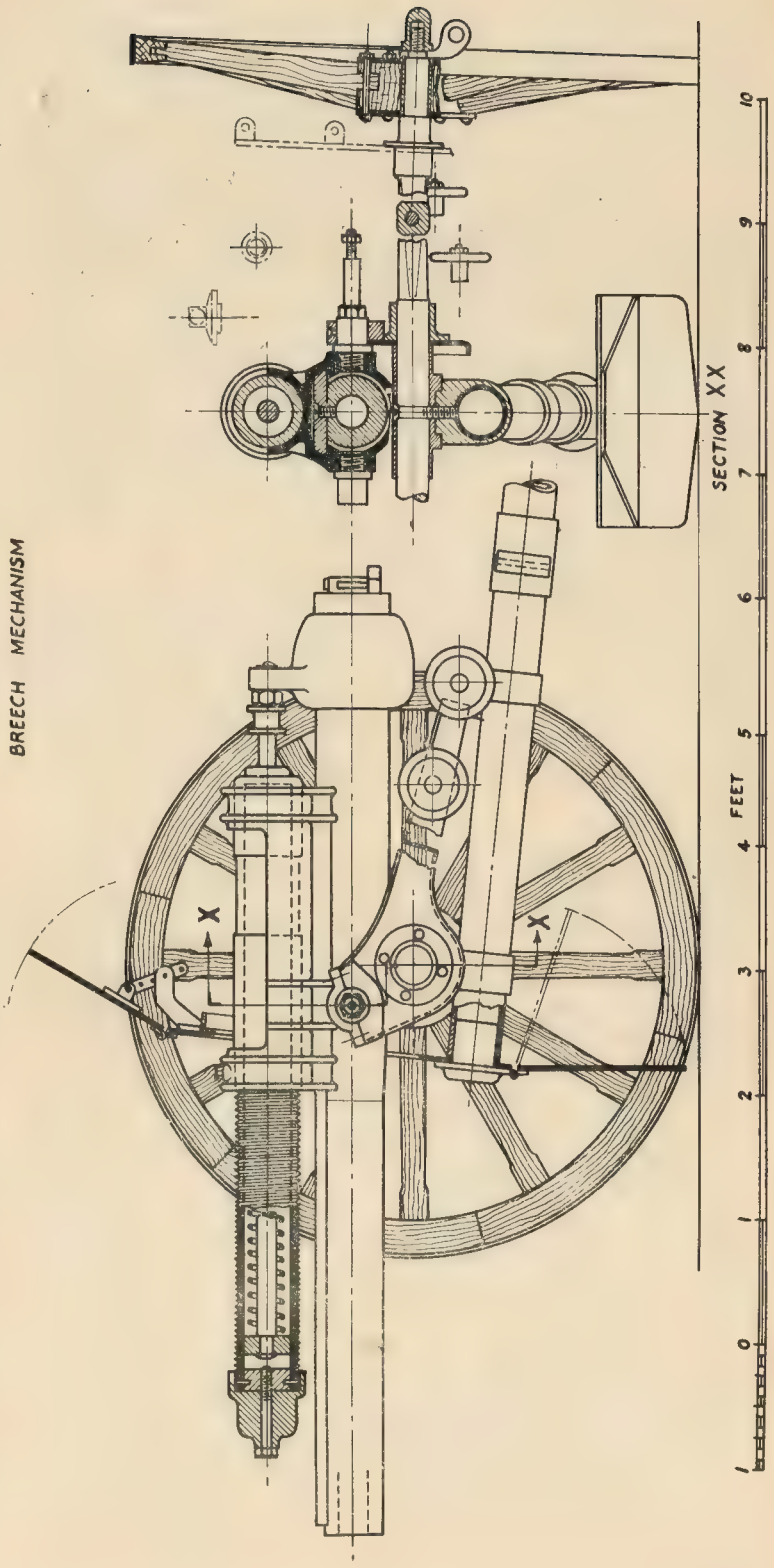


BREECH MECHANISM

is by a ¼ in. dia. round belt. It is neither backgeared nor screwcutting, and all threads have to be cut with taps and dies; when turning, light cuts only can, of course, be taken. However, I do not find this to be any particular disadvantage, being possessed of a reasonable amount of patience.

The barrel was naturally the first item to be tackled. This was a plain turning job and the steel took a nice tool finish. Some stout work with a file provided a flat on top of the barrel extending almost the whole length. This was for the flat rubbing strip which acts as a guide for the cradle, and which was filed up from a piece of 1 in. × ⅛ in. flat mild steel; it has V-shaped edges. The rear end of the barrel was recessed ⅝ in. dia. to fit the spigot on the breech housing.

The cradle in the prototype is made of bronze, so I followed this practice in the model. It is fabricated from tubing and flat strip, all carefully fitted, and finally silver soldered up at one heat. This was an interesting but somewhat hair-raising job, as 18 separate joints had to be soldered at the one time.



A MODEL 18 POUNDER GUN . . .

I found the best way to accomplish this was by an elaborate system of binding all the pieces together in their correct relative positions with wire. Ordinary iron wire fused in the flame at sharp bends, so I eventually used nichrome wire taken from a burnt-out electric heater element. This functioned well and stood up to the blowpipe flame admirably. I now use this type of wire for all silver soldering where components have to be supported or held in position during the operation.

The cradle, in addition to being provided with trunnions, also accommodates the steel recuperator cylinder. (The left-hand trunnion is extended to provide a support for the rocking-bar sight.) Inside the cylinder is a piston rod, the outer end of which is bolted to a lug on the top of the breech housing. The purpose of the recuperator is to return the gun barrel to its normal firing position after recoil, and in the model this is effected by an internal coil spring (in the original it is hydraulically operated by an oil system).

The front portion of the full-size cylinder exterior is screwed into the cradle with a fine thread. As I was unable to cut a thread on the model, I cheated and turned a series of parallel V-grooves with a fine-pitch outside chaser instead. This simulates a screw thread very effectively, and few people have as yet detected that it is not an actual helical thread.

The front end of the cylinder is closed with a steel cap, and a dummy oil-filling plug is fitted to the top of the cradle. When the gun barrel recoils on firing it draws the piston rod to the rear, compressing the spring. As the cradle remains stationary, being held to the carriage by the trunnions, the barrel gradually slows in its movement and the spring then returns it to its former position, being guided by the rubbing strip and the slides in the cradle.

The gun is fitted with "single-motion breech mechanism." To operate it, the breech lever is pulled outwards. This action rotates the breech plug and unlocks it, then with the continued movement of the lever the plug swings clear of the breech. This leaves the bore clear and allows the gun to be loaded. The reverse action, of course, closes and locks the mechanism.

Space limitation

Owing to lack of space, and the necessity of retaining scale appearance, it was not possible to embody the methods used on the prototype, which employed bevel gears. After some cogitation a scheme was devised; this proved entirely satisfactory, and is described below.

The breech housing was turned from a piece of 1¼ in. mild-steel round bar, with a spigot to fit the recess in the end of the gun barrel, and the thread used to accommodate the breech block was ¼ in. B.S.P., left hand. (A left-hand thread was necessary in order to give the correct opening when the lever was pulled, and was tapped in the vice.) A steel lug was silver soldered to the top of the housing, as previously mentioned, to which the rear end of the recuperator piston rod could be bolted. A pair of ears were inserted and pinned in the right-hand side of the housing to support the hinge of the breech block.

The breech plug was screwed ¼ in. B.S.P. (left hand) in the vice with a suitable die, and tapered at the end as shown. The breech hinge, or carrier, which is 7/32 in. thick and made from the solid, is tapped to correspond to the thread on the plug. It was then chamber-bored behind the thread to leave a wall about 1/32 in. thick. A rectangular slot in the hinge accommodates the breech lever.

The rear end of the breech plug has a series of 1/32 in. silver-steel pins radially disposed, driven in position, faced off and then filed to form teeth. Teeth are also filed on the end of the breech lever to engage with the pins.

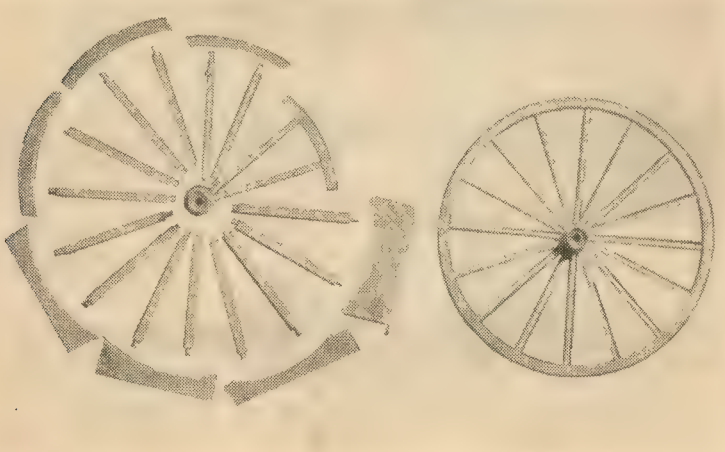
To enable the plug to enter and lock into the breech housing, two equally-spaced segments of the thread are filed out in both components. Consequently, upon closing the mechanism the threaded portions on the plug are opposite the plain portions in the housing. When the lever is pushed home, the teeth engage those in the block, turning the latter through 90 deg. and effectively locking the breech block in position.

As the breech hinge swings on a radius immediately the threads become disengaged, both the hinge and the block have to be eased slightly to allow for this. This calls for some careful fitting, but the result is well worth while. A dummy firing pin can then be fitted, if required, for the sake of realism.

The complete breech housing is secured to the spigot on the gun barrel with two 8 B.A. countersunk screws. A lever and link, connected to a dummy pin in the left-hand side of the breech block, represents the firing gear; it is spring loaded. A shoulder guard for the breech mechanism is also fitted.

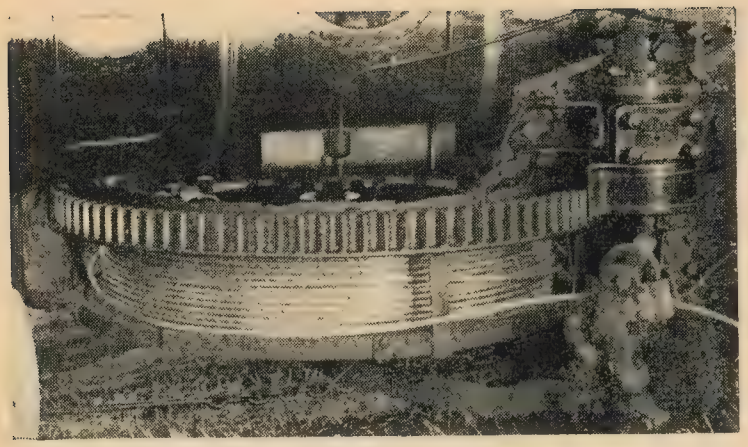
● *To be concluded*

Method of wheel construction, showing a wheel ready for tyring



MAKE YOUR CASTINGS

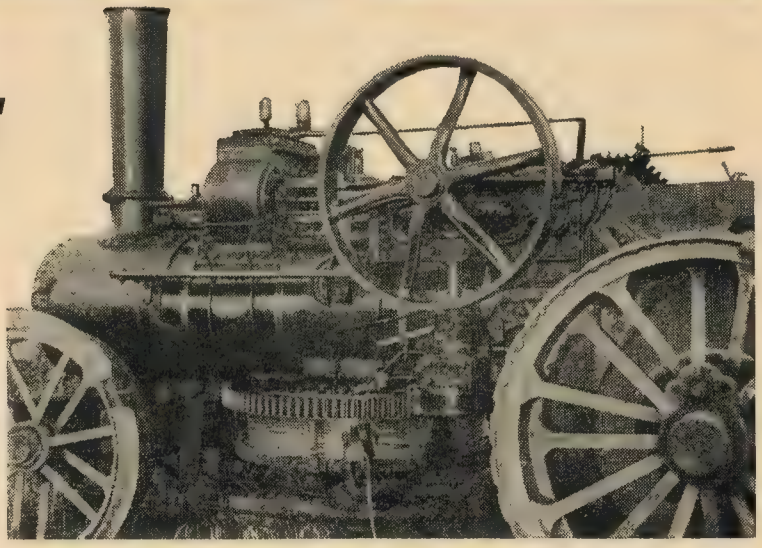
Foundrywork for the Amateur by B. Terry Aspin is a profusely illustrated book covering all aspects of light foundrywork. Types of sand, moulding boxes and pattern making are fully discussed and there are copious references to the melting of iron, aluminium and cupreous alloys. Stirrers, skimmers, plungers, fluxes and innoculants are also dealt with fully. Price 5s., plus 3d. postage, from Percival Marshall, 19 Noel Street, London, W.1 (U.S.A. and Canada $1.25)

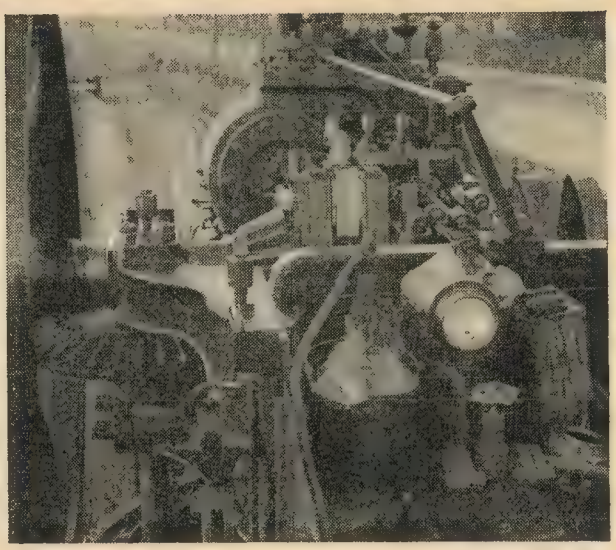


STEAM ENGINES

in Lincolnshire

A pictorial review of some stalwart ploughing engines which are still doing yeoman service in the Fens. J. T. BEATON took the photographs





STEAM PLANTS in model power boats

MERIDIAN lists a few hints for efficient steaming and running

ALTHOUGH small compression ignition and other i.c. engines are very popular with power boat exponents, as a choice of power plant they have not always been held in such esteem. Many power boat men who commenced activities before or during the war gained their experience with steam as the motive force.

The reason was partly an enforced one, since there were few small i.c. engines on the market, but there *were* plenty of small, reasonably priced steam-engines designed for marine work. An expenditure of less than £2 could buy a complete plant consisting of a double-acting piston-valve engine and a boiler and lamp—a real boon for enthusiasts with little workshop equipment.

Nowadays, the high price of ready-made steam plants rules out this form of propulsion as far as many beginners are concerned. Nevertheless, steam remains more suitable for certain prototype boats. Destroyers, liners, cargo boats and tugs spring instantly to mind in this respect. High performance can also be achieved in steam launches if one knows what to do to obtain efficient working.

Newcomers to power boating who have a lathe or access to one and can use it a little should be able to build a steam plant without too much difficulty. The accuracy required for an engine to work (at least somehow !) is much less than for a corresponding i.c. engine.

This fact, however, should not be an excuse for indifferent workmanship; every effort should be made to keep the standard as high as possible, and this applies especially to the cylinder bore and piston fit.

The beginner can nevertheless take comfort from the fact that his first attempt, however crude, will probably work, and thus valuable experience will be gained.

I hope that these hints will assist potential steam exponents by pointing out some of the essentials necessary to obtain a good and economical performance from model marine steam plants.

Nothing is more disappointing than a steamer which starts off well from the pondside but reduces speed as a greedy engine rapidly knocks the boiler pressure down. In my early days of power boating I suffered this rather galling experience for a considerable time until an experienced power boat man put me right.

But before discussing engines, just a word about the layout. Some beginners make the error of siting the engine aft in a launch-type boat. In most cases this tends to depress the bows when under way. It is better to place the engine forward so that the propeller shaft angle is more favourable. For a prototype boat, however, the aft position is obviously correct.

The chief points for discussion fall naturally in three groups—engine, boiler and firing. The two latter are, of course, interconnected to some extent.

ENGINES

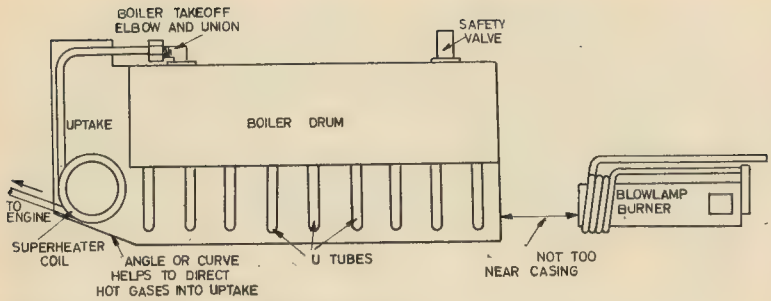
In my experience one common cause of excess steam consumption in model marine plants is poor valve timing. Mostly this consists of too much admission and not enough advance—in other words, our old friends "lap" and "lead."

The thing to aim at is an admission period of around 100 deg., with the steam port actually open a little on top dead centre. This sort of timing could be modified a bit in the case of a plant intended for a prototype where easy starting and more flexible control is required, but even then a retarded timing that admits steam all the way down the stroke must be avoided.

When using the popular double-acting slide-valve type for a reasonably high performance, it is astonishing how much advance can be successfully used. Settings where the steam port is open a full 1/32 in. on t.d.c. are quite possible, given a good valve travel, with the engine developing plenty of power, although starting up is more difficult.

One of the problems concerning valve timing is that the existing valve travel may be insufficient to give enough area of port open to steam when the valve itself is lengthened to reduce the total admission period. To get around this, the travel may be increased or the ports made wider.

Mr Lockhart (Kingsmere M.P.B.C.) starting up his steam launch



Section through typical blowlamp-fired boiler

One point must be emphasised—with good timing the whole of the cylinder port may not be fully opened to steam *but it must be fully open during the exhaust period.* The diagrams which show the port face of a typical d.a. slide-valve engine should illustrate this timing business fairly well.

If one is improving an existing engine, a new valve will have to be made, so the possibility of increased travel or greater port width should be considered in advance. Incidentally, make sure that the steam and exhaust *passages* are adequate—it is useless to have a nice big port in the valve chest if it changes to a little hole between port and cylinder.

A good rule is to maintain the area of steam passages at least as large in area as the port when open to steam. Exhaust passages need to be larger if possible than the exhaust port itself, so that the spent steam has the easiest possible escape. Make the cavity in the valve as deep as is practicable. If necessary, make the valve deliberately deeper, using a copper gasket between portface and steam-chest to compensate for the deeper valve.

Remember that steam wants to expand all the time and if the exhaust is to be led up the funnel an exhaust pipe of really adequate size should be provided.

LUBRICATION

Many of the steam plants seen in boats at regattas have " hit and miss " methods of lubrication. The chief culprit is our old friend the displacement lubricator. The best method of cylinder lubrication is undoubtedly by pump driven by reduction gearing from the engine. This is not to say that displacement lubricators are useless; if made of adequate size and, more important, if sited correctly, the displacement lubricator will work quite well.

Many lubricators of this type are far too small to ensure lubrication for more than a short period. Perhaps theoretically able to supply oil for 30 min. or so, in practice it is usual to find a smallish lubricator empty after only 5-10 min. run.

One reason is the siting of the lubricator, as mentioned above. With lubricators attached directly to the steam-chest, any sudden pressure drop in the chest, for example when the steam cock is operated quickly, forces large quantities of oil out of the lubricator as the pressure tries to equalise. This is commonly called " gulping " and it is possible to completely empty a small lubricator by turning the steam supply off suddenly.

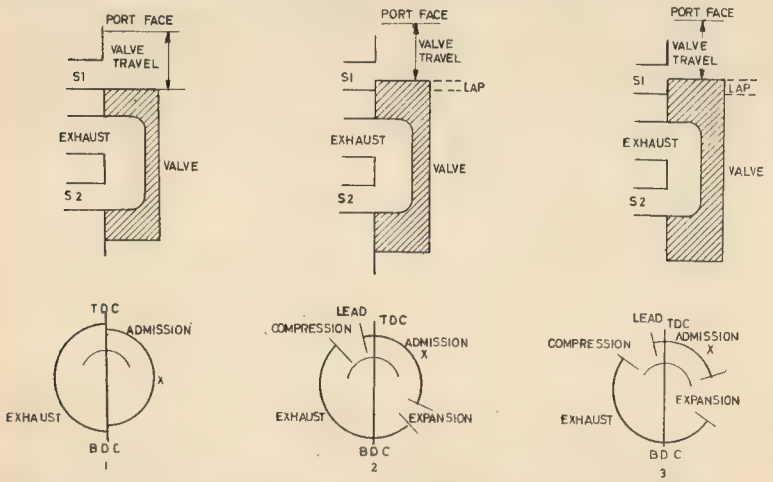
A remedy for this nasty habit is to place the steam control very close to the steam-chest and site the lubricator on the boiler side of the control, so that sudden changes in pressure are less likely to occur.

One other point concerns the overheating of lubricators. In order to operate, the displacement type depends on the condensation of steam which, as water, gravitates to the bottom of the chamber, oil being forced out past the same needle valve that admits the steam.

If the body of the lubricator becomes overheated, condensation cannot occur and the lubricator stops operating. When using steam with little or no superheat, the problem will not arise, but since steam economy requires at least some superheat, care should be taken that the lubricator is not affected additionally with stray heat from the boiler and lamp.

In addition to cylinder lubrication, the bearings, big-ends, crosshead guides, etc., can be gravity fed from an oil box via small tubing. Not only will the engine work better but it will last much longer before reconditioning is necessary. Such oil-feed pipes ought to be controlled in some manner, for when warm, oil will run through a $\frac{1}{16}$ in. o.d. pipe very quickly.

One way of preventing this is to provide an oil gallery with each pipe controlled by a pointed 8 B.A. screw and locknut sited opposite each take-off point. A cruder method is to pinch the ends of each pipe to restrict the flow. The latter suffers from the defect that if blockage occurs it is much more difficult to clear.



Illustrating the effect of lap and lead on timing. For clarity, lower diagrams show events of S_1 and exhaust only. All valves are fully open in S_1 position X shows position of main crank

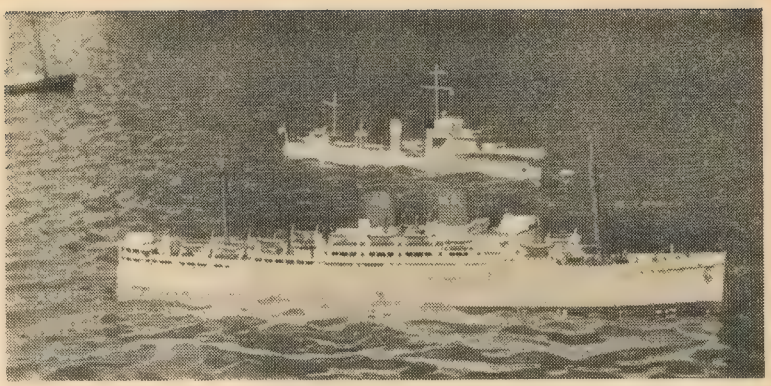
BOILERS

In MODEL ENGINEER for February 7 Edgar T. Westbury covers the subject of boilers and firing pretty thoroughly, but I hope that I can add some further tips which may enlighten the beginner.

The centre-flue boiler was once the automatic choice for model marine work. It has several good features and some not so good. Let us consider the good ones first: 1. efficient steamer if fired correctly; 2. little stray heat to damage hull; 3. low centre of gravity.

Now the bad points: 1. heavy (not a bad feature in some prototype craft); 2. firing limited by size of centre flue; 3. if the water level is allowed to fall below the top of the flue the local

Steam plants in model power boats . . .



Typical steam-driven models at a St Albans regatta

heating and internal pressure may cause a "blister" or the complete collapse of the flue.

One other point is that a good size boiler must inevitably be expensive, even to make, due to the high price of copper these days.

The centre-flue is fine for large prototype boats where the low centre of gravity and weight are good features, but a mechanically driven water pump should be fitted unless the boiler is of such dimensions that it will steam for some time before the danger level is reached. Even then a watchful eye must be kept on the water level.

One important point—do not try and use too large a flame for the flue. In my experience a 2 in. dia. flue will only need a blowlamp flame tube of $\frac{3}{4}$ in.-$\frac{7}{8}$ in. dia. Attempts to force a bigger flame through the flue will probably result in "blowback," a stuttering lamp and poor steaming.

The water-tube boiler is a good choice for many marine steam plants. It is a good steamer, can be boiled to a low water level without damage and is very much lighter than the centre flue type. Further, there are several different methods by which it may be fired.

A mistake that beginners often make concerns the boiler *casing*. The diagrams show sectional views of some designs. Whatever the method of firing, the burner must have enough air for proper combustion or the boiler will not be able to supply steam at anything like its full capacity.

A few feet of copper tubing coiled within the uptake end of the casing will ensure a certain amount of superheat, especially if the residue of flame from the lamp is allowed to play around some of the coil. A word of warning—avoid too much superheat with brass cylinders, but gunmetal, bronze and cast-iron will stand quite a lot of heat without trouble.

Dribbling safety-valves are frequently the cause of wasted steam. I have always favoured the use of the "pop" type often described by L.B.S.C. and I have had no trouble in this respect.

FIRING

Let me advise the beginner straight away to avoid spirit firing in anything but very small boats or craft designed for indoor operation on static tanks. Even the vaporising pattern tends to be troublesome and few of the spirit-fired jobs that I have ever seen have been able to maintain much in the way of pressure.

The usual "boat" design of blowlamp is easy to make and seems to work more efficiently than the commercial "painter's" type of burner. It consists essentially of a pressure container, a thin metal flame-tube and about 3 ft of copper or brass tubing, most of which is wrapped around the business end of the flame-tube.

Providing that the casing is suitable and also that thin asbestos sheet is arranged to protect both the casing and the hull where necessary, the torch pattern lamp as described above will fire a water-tube boiler quite safely. This, in spite of the somewhat fearsome appearance of the flame emitted by such lamps !

Adjustments of the jet size and of the amount of air admitted to the burner will enable petrol, paraffin or mixtures of the two to be used. Jets may be purchased, since the M.E. thread of $\frac{1}{4}$ in. × 40 t.p.i. appears to suit one of the popular sizes which are available.

Burners of the vertical diffused flame pattern are also very suitable for firing water-tube boilers and would appear to offer special advantages for some prototype craft. Strangely enough, there appear to be few of these burners used in the regular regatta boats, most competitors with steamers preferring the torch burner.

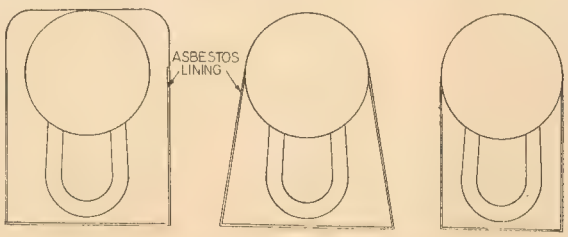
A common fault of beginners is to site the blowlamp burner (torch type) much too near the firing entrance—sometimes actually right inside ! This also applies to centre-flue boilers, with the result that the flame is starved of a proper air supply. A distance of $1\frac{1}{2}$-2 in. is desirable between the end of the burner and the boiler casing.

With prototype boats, remember to ensure that there is enough ventilation through the deck to supply air to the burner. With a reasonably efficient engine and boiler quite a small lamp will provide plenty of power, so that the apertures in the deck need not be too obvious or unsightly.

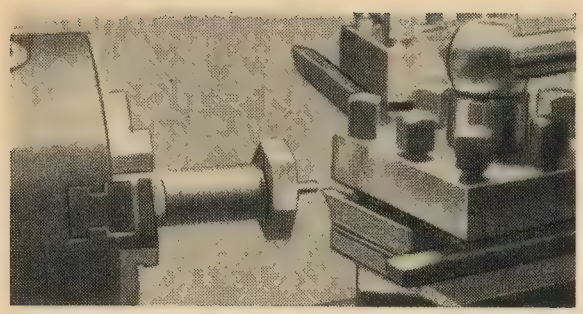
As an example of the performance than can be obtained from a good steam plant, the following may be of interest:

A $\frac{3}{4}$ in. × $\frac{3}{4}$ in. double-acting slide-valve engine, steamed by a Scott water-tube boiler $2\frac{1}{2}$ in. dia. × 9 in. long, fitted with eight tubes, $\frac{5}{16}$ in. dia., and a torch-type burner with a $1\frac{1}{8}$ in. dia. flame-tube, had no difficulty in maintaining 100 p.s.i. without pressing the lamp. It provided a genuine 10-12 m.p.h. when installed in a metre hull.

In conclusion, I would say that even a simple boiler fitted with only a few tubes is quite capable of maintaining 50 p.s.i. providing attention is paid to the items mentioned. This should give a lively performance in either a launch or prototype craft, without having to whack up the pressure to get a run across the pond! ▣



Sectional diagram of boilers (U-tube type) and casings for blowlamp firing. The example on the right will need a smaller flame than others



Cutting small screws to length . . .

By A. W. SMITH

I HAVE BEEN using a device for chucking small screws, similar to that described by Mr E. K. Larkin in MODEL ENGINEER in June.

My idea is similar but, to my mind, simpler and easier to use because, first, there is no need for so many nuts—a small disc or washer being used for each screw size without the need for threading; secondly, the tongue is unnecessary as the pressure exerted by the nut is sufficient to hold the screws, hand tightening alone preventing its turning; thirdly, three turns of thread are quite enough and this avoids a lot of running on and off of the nut and is ample for tightening up.

I made my device from an old bus engine stud and nut, but any similar stud will do, with any thread. Face the end and leave a small countersink in the centre. This is to clear the pip on any hexagon head which some of them have left on, and it helps the adhesion on a flat head such as these and countersunk or cheesehead screws.

Mark the stud opposite No 1 jaw of the chuck so as to always chuck it in the same position. Weld a blank on one end of the nut (or make a new one), reduce the threads at the other end until you have about three full threads inside, run it tightly on to the stud and chuck the lot with the mark at No 1 jaw. Turn out the blank end of the nut until it is the size and shape shown and that is the first part finished.

The washers can now be made and are simply drilled various sizes starting from the smallest, and then parted off. They can also be drilled in situ if desired, but this is not essential. Make one for each size of screw and stamp the size on each for reference.

To use the tool (with any type of head) simply insert the screw in its respective washer, drop it into the nut and run it on the stud, tightening by hand only. This is usually sufficient but I am going to weld a small tommy bar on to my nut as my hand gets sore after doing a few dozen screws for my *Britannia*. I have shown this in case readers would like to put one on.

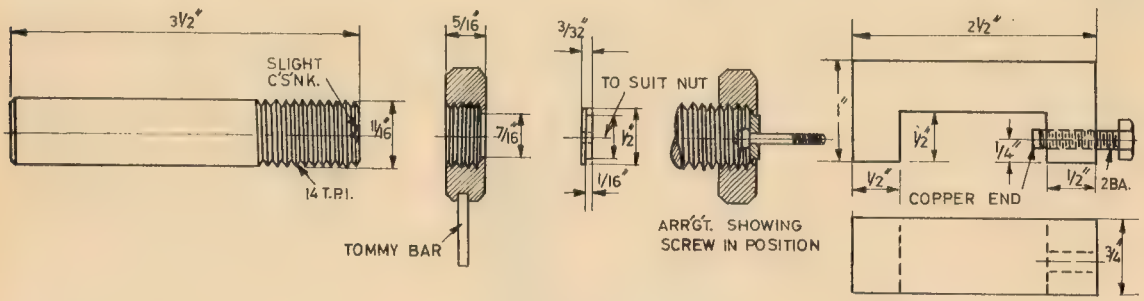
I use a V-tool in the topslide, slewed round a bit to get the coned end, and this works very well, making a nice finished end. The nut goes straight on as there are no burrs.

To obtain the correct length every time make a small saddle stop, as shown in the sketch, which is easily clamped to the lathe way, any side, in the approximate position, the final position being obtained by the topslide. Take light cuts right up to the stop each time by advancing the saddle and advancing the cross-slide a little for each cut until the reduced metal finally drops off. Then advance the tool to a pre-determined figure on the cross-slide register and all your screws will be of equal length and look well finished.

I have found that some screws, being slightly larger than standard, must be used in a washer the next size larger. This makes not the least difference to the operation or finish and even if the screw is way out of centre it works just the same and the difference on the end is not noticeable.

To avoid a lot of machining, long screws can be and should be nipped off close to the finished length, but care must be used when machining as the burr left by the nipping process is liable to catch up in the tool and the screw will be bent. It is a good plan to remove the burr with a file. All this is done while being held in the device.

I altered an old instrument case which is shown in the photograph and in this the device is kept protected from dust and rust and held together in a handy set. There are 11 washers, one for each B.A. size up to No 10, which is wide enough scope for model builders, but I have machined $\frac{3}{8}$ in. bolts in the same way with the same results and I daresay larger sizes can be handled. ▣



Two books which are of interest to all who face problems of screw cutting and screw threads are *Practical lessons in metal turning and screw-cutting*, by Percival Marshall, price 6s., and *Screw threads and twist drills*, by Duplex, price 3s. 6d. Both are published by Percival Marshall and Co. Ltd, 19 Noel Street, London, W.1. If ordered direct from the publishers, in the case of the first title add 8d. postage and 3d. for the second.

TRACTION ENGINE TOPICS

More valiants of the 'Nineties

In this article C. E. PAGE goes into the early problems of springing the rear wheels of traction-engines

WAY BACK at the turn of the present century, around the time of the "Emancipation Act" of 1896, it was realised that since the 1860s, road locomotives capable of hauling heavy loads over very indifferent roads at fair speeds, and adaptable as portable engines for power on farms, had been increasingly successful.

But the freedom of movement permitted to them was sadly restricted by law, and it was further hampered by the absurd and conflicting regulations of different counties and districts. Indeed, if traction-engines had been allowed as many privileges and as much freedom as they had in France, the most important problem of agricultural transport in Great Britain could have been solved.

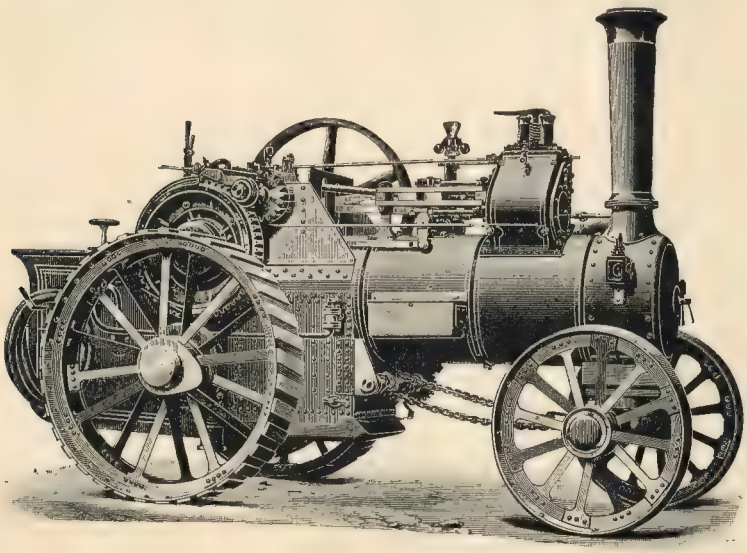
As it was, the traction-engine only survived until the twentieth century because of its great usefulness as a convenient and economic means of transporting farm produce and village necessities to and from the railway station, for even though hampered by law, it could perform, where permitted, all the work that the then newer form of transport—the light railway—could be expected to do; to say nothing of ploughing and threshing on the farm.

The 10 h.p. twin compound Foden traction-engine of 1896 was a superb example of a road locomotive of the day. Weighing 17 tons in working order, one of these massive machines travelled over 80 miles to the Leicester Agricultural Show of 1896 drawing a 40-ton train of loaded wagons.

The engine had $6\frac{3}{4}$ in. and $11\frac{1}{2}$ in. $\times$ 12 in. cylinders, and gears, shafts, and boiler were of steel; the latter contained 78 tubes each 6 ft in length. Driving-wheels were 7 ft 2 in. dia. over paddles, and were mounted on a 6 in. dia. axle, the upper structure of the machine being carried on three laminated springs, two at the firebox end, and one under the smokebox. A steam, as well as the usual manually-operated, brake was fitted.

Single-cylinder traction-engines had been in general use since the very earliest days of traction-engine design, but it was Edwin Foden who, in 1880, introduced two-cylinder engines which gave more even running, and the following year pioneered the compound engine when he fitted one of 10 h.p. to one of his traction-engines which worked at 140 p.s.i. steam pressure. Nine years later, in 1890, Messrs Charles Burrell, the famous builders at Thetford, introduced an 8 n.h.p. single-crank compound which was indeed a very neatly arranged locomotive.

Burrell single-crank 8 n.p.h. compound traction-engine of 1890



In this rather unconventional engine the two cylinders were arranged diagonally one above the other, their piston rods being connected to a single crosshead; no receiver was thus required between the cylinders, and a very compact layout was secured. As there was only one crank used, much longer crankshaft bearings were possible and wear and tear were correspondingly reduced.

Owing to the diagonal position of the piston rod, the crosshead tended to twist but it was prevented from doing so by providing it with flanges which worked on the inside faces of the guide-bars as well as by making it longer than usual.

Steam distribution was effected by a single link motion, and engine diagrams proved that wire-drawing was almost entirely absent owing to the ample port area of the valves. Although only of 8 n.h.p. this Burrell developed no less than 42 b.h.p. in the third notch of back gear at 160 p.s.i., and under such conditions it could haul a load of 21 tons up a 1 in 13 incline, or 34 tons up 1 in 15. In fact, so successful were these engines that Burrells determined forthwith to cease building further two-crank compounds.

SPRINGING OF TRACTION-ENGINES

Although it was in 1805 that Obadiah Elliot invented the leaf laminated spring in elliptical or semi-elliptical form, it was not until well into the Nineties that traction-engine designers seriously attempted to spring their gear-driven productions. The springing of chain-driven engines was comparatively easy, but the alteration of gear-wheel centres and the use of links, joints, and universal couplings

between the intermediate shaft and main driving axle introduced all sorts of complications.

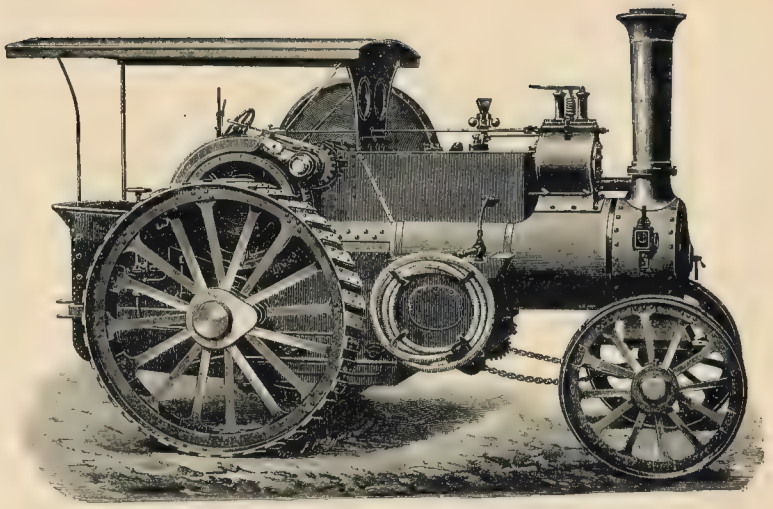
The sideways motion in the teeth of the spur-wheels and pinions (which was an objection on all forms of spring drive other than that introduced by Aveling and Porter in 1894) caused great wear on the teeth, which altered their pitch-lines when the engine was traversing rough ground.

The spring-mounted Burrell engine of 1888, of which 40 had been built by the middle of 1890, was specially designed for rough, heavy haulage in the south of England, and the method of driving the sprung rear wheels is worthy of notice.

Drive from the crankshaft to the countershaft was by means of pinions meshing into the spur-wheel, *C*, which revolved upon a fixed steel tube, *D*, and was connected to the countershaft by way of a universal joint, *E*; the other end of the countershaft being carried in the bearing, *F*, which was free to move vertically in the box, *G*.

Bearing, *F*, was connected by a link, *H*, to axlebox, *J*, which was also free to slide vertically in the guides, *S*, secured to the hornplates, *X*, so that both countershaft axle and driving-wheel axle rose and fell together as the engine rode up and down on its springs.

On the countershaft was a pinion, *M*, engaging spurwheel, *N*, which carried the drive to the road wheels, and these two gear-wheels were prevented from altering the distance between their centres—and so getting out of mesh—by the link, *H*. They also had sufficient clearance at the sides of their teeth to allow for any sideways motion caused by the action of the engine springs.



Burrell spring-mounted traction-engine of 1888

Axlebox, *K*, was free to slide vertically in its guides, *S*, but its motion in no way interferred with the gearing centres. The steel tube, *D*, was carried right across the engine and was bolted to box, *G*, which was fastened to the hornplate, *X*, and thus formed a solid bearing for spurwheel, *C*, as well as being a strong stay to the hornplates, *X*, preventing the latter from buckling or twisting.

Rear springing was by volute springs and the front of the engine was carried upon one transverse spring fitted in the fore-carriage casting and adjustable by removing a cap in the interior of the smokebox.

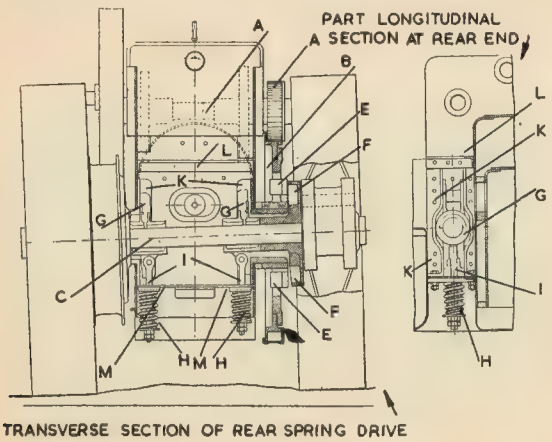
The boiler of this 1888 Burrell, which was pressed to 150 p.s.i., was fitted with a copper firebox and brass tubes; the grate area being 5.3 sq. ft and the total heating surface 155 sq. ft.

A 9 in. × 12 in. steam-jacketed cylinder drove a piston working a 3¾ in. dia. crankshaft.

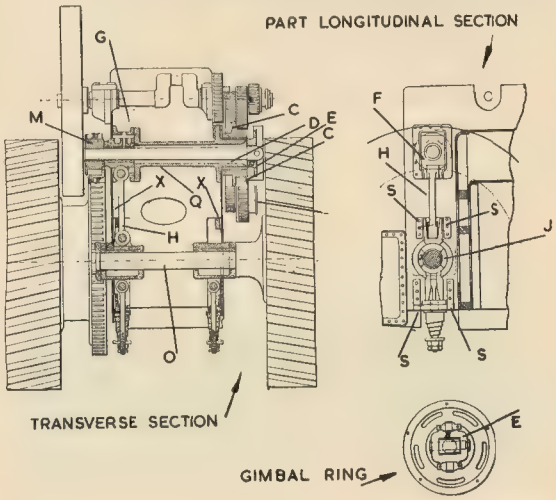
A water-lifter and a Gresham injector were fitted, 180 gallons of water being carried in the tank. Driving-wheels were 6 ft 6 in. dia. with 16 in. treads, the front wheels being 4 ft 1⅛ in. dia. with 9 in. treads. The awning—as it was termed—was supported in front by a wrought-iron plate fitted with brass-framed spectacles.

The Aveling and Porter spring-mounted traction-engine of 1894 overcame all the complexities of the Burrell sprung engine by fitting coiled springs on either side of the engine which worked independently and, therefore, came into action at whatever the vertical position of the road wheels —within certain limits. ▣

Transverse and part longitudinal sections of the Aveling and Porter spring-mounted traction-engine of 1894, *showing the rear suspension system*



Transverse and part longitudinal sections of the Burrell spring-mounted engine of 1888



50 years ago

Fuel shortages are nothing new, as we learn when we turn back the pages of "Model Engineer"

DRIVING ON BRANDY

ONE DAY in 1907 the Shah of Persia—of all people in this world—was urgently in need of petrol. The Shah had bought an expensive motor car, the Cadillac of its day, and had gone to meet it at Teheran. Like everybody who has a new car delivered, he was enormously eager to use it, and we can, therefore, imagine the consternation of the royal retinue when someone discovered that there was nothing to put in the tank. The car had been unpacked and was all ready to go—except for this one ingredient lacking.

Oriental potentates, however, do not let themselves be disturbed by such trivial difficulties as an empty tank. It there was no petrol in Teheran there was plenty of brandy.

As a car used by a shah must travel only on the very best stuff, a fine old cognac was brought along. It cost (1907 price) about £2 a bottle.

THE M.E. MOTOR BICYCLE

CAR-OWNING readers in the spring of 1957 are unlikely to find much consolation in this story from MODEL ENGINEER of 50 years ago. In those days very few people had cars but MODEL ENGINEER readers were nonetheless greatly interested in the internal combustion engine.

There was even a M.E. motor bicycle. One of those who made it from drawings in these pages was a locomotive driver, who explained that he had kept to Mr Hawley's drawings except in one particular: he preferred an outside flywheel to an inside.

"The cylinder," he wrote, "is 75 bore by 76 stroke [in millimeter]; crank is a mild steel forging with balanced webs, all in one piece; crank pin $\frac{7}{8}$ in. diameter; connecting rod is marine type, bronze being used for all bearings; timing wheels are mild steel; and the valves are nickel steel, $1\frac{1}{2}$ ins. on the head. I might mention that the wheelbase is about 54 ins.

"I ride all times of the year and learned to ride entirely on a motor cycle. My occupation is that of a locomotive driver, but I enjoy a ride on my motor bicycle better even than running a locomotive at sixty miles an hour."

We are not told his top speed on the road, but we can be sure that, whatever it was, the local travellers in traps, carts, jingles and carriages regarded him as a flying demon.

THE ROAD TRAIN

THE anonymous driver by road and rail, mentioned above, must have been very much interested in Colonel Renard's attempt to combine the two.

Colonel Renard, an engineer officer of the French Army, had invented his road train in 1903. London saw it four years later. It may surprise some to know that there was already at that time a Commercial Motor Vehicle Exhibition. In this show, at Olympia, the Renard Syndicate put the train on view as a practical proposition. Renard trains were actually running in Europe and the Daimler Motor Company had acquired the sole rights of their manufacture outside France.

"A light tractor," wrote MODEL ENGINEER in April, "is provided principally for the purpose of carrying the motor which generates energy for propulsion and for steering purposes.

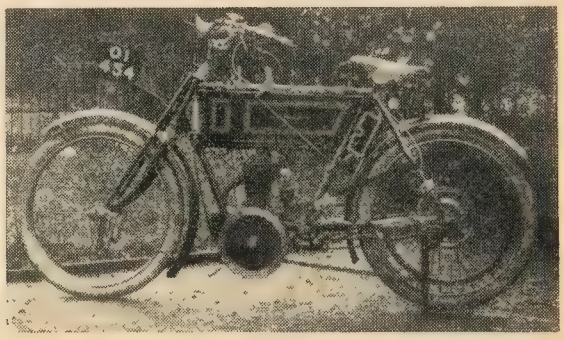
"Each unit of the train is provided with a longitudinal driving shaft, gearing with a differential gear on the shafts of which are fixed road driving wheels. The driving shaft is connected up to the motor on the tractor by suitable universal couplings which allow a very large angularity of movement between tractor and unit and between units themselves, such as is required when necessary to turn round sharp corners, etc. Each unit of the train is provided with similar shafts and couplings.

"It is readily apparent that by these means the power from the motor can be equally and readily applied to each unit as it is coupled up. In addition to coupling up for taking off power, each unit is provided with radius steering rods, which are linked together, and finally to the steering arrangement on the tractor, the mechanism allowing the direction of each unit to be completely guided, compelling all to follow exactly in the path of the tractor, and applies equally to forward or backward motion.

"One of the advantages claimed for this system being that the compensation of springs and axles allowed for all surface irregularities and the facile surmounting of any obstacle without strain or injury to components of units."

Right:
The 2½ h.p. motorcycle built from MODEL ENGINEER *plans*

Below:
The road train devised by French engineer Colonel Renard



YACHT CLUBS FORMED

IN 1907 the model engineering movement was spreading throughout the world. In Britain, Clacton had formed a model yacht club for model yachtsmen who were residents in Clacton-on-Sea, Great Clacton, or Little Clacton. There were two sections, one for powered models and the other for sail. Secretary J. W. Goldsmith of Southwood, St Osyth Road, Clacton-on-Sea, announced a large number of entries for the first club race, to be held on Easter Monday.

As we would expect, the North of England was well represented in the movement.

Secretary George F. Paris of Stanley Model Steamer Club wrote from 123a Westminster Road, Kirkdale, Liverpool 1, to say that the club had been formed " so that we can work together and abide by our agreements with the sailing boat owners as well as for friendly sport and fellowship."

Differences had occurred between the model steamer men and the owners of sailing boats, a reflection in miniature of a high-seas rivalry whose echoes lingered.

For members of Leeds Model Yacht Club, which had been revived, the trouble was rowing boats. The rowing interferred with their pleasure at Roundhay and they were glad to visit Kirkstall Abbey when the pond there was flooded for skating but not frozen.

Secretary J. McCaw of 24 Dorset Terrace, Leeds, reported a membership of nearly 50 and a prosperous beginning to the new season. ▣

ENGINEERING 60 YEARS AGO

By E. B. HUGHES

SIXTY YEARS AGO, when Queen Victoria celebrated her Diamond Jubilee, the steam locomotive reigned supreme and the standard means of transport on the road was still the horse. The gas and oil engine was pushing its nose into the smaller works, however, and the introduction of electricity in the larger towns was making the electric motor possible for small powers; and a horseless carriage might be met occasionally. These times are within the memory of those readers who bought No 1 MODEL ENGINEER AND AMATEUR ELECTRICIAN, as it was then called.

What was " up-to-date " in those days ? The perusal of two volumes of *The Engineer* covering six months each in the years 1896 and 1897 gives interesting light on the times. Paper was cheap and wages very different to today, which may account for the large plates and working drawings frequently accompanying an issue. The plates were reproduced from drawings (not photographs) and they were done with an extraordinary amount of detail and accuracy.

Two locomotive plates arrested my attention as both were of engines destined to become famous, namely, Mr Worsdell's four-coupled " 1869 " of the North Eastern Railway, and Mr Whitelegg's 10-wheeled tank *Westcliff* of the London Tilbury and Southend Railway. This latter engine became the standard type on that line for many decades.

The single wheeler was still popular and a fine drawing is given of the London and North Western 7 ft 9 in. *Princess Royal*, Mr Webb having decided to perpetuate the class, dating back to 1862, by rebuilding with 3 in. thicker tyres and a larger boiler carrying 150 in place of 130 lb. pressure.

A photograph is shown of an even older engine " still at work on the Furness Railway "—a genuine Bury of 1846, whose high firebox appears to afford some protection to the enginemen, there being no cab. Talking about cabs, many of the American locomotives shown in the books had the cab on the middle of the boiler—but this fashion had a very short life I believe.

MODEL ENGINEER had yet to be born and that no doubt was why the late Dr Bradbury Winter gave a full description in the periodical of his London and Brighton *Como*. He stated the model was 13 years in building, which would take us back to 1883. This gifted modeller, who is, of course, well known to most readers, certainly had a long run with his hobby.

Sixty years ago the motor car was *rara avis* and the word petrol unknown. Official regulations called it " petroleum " and " mineral spirit used in light locomotives." Still times were on the change and new regulations permitted a speed of 14 miles an hour for road vehicles. Local authorities had the power, unfortunately, to reduce this and in the case of London the reduction was to eight miles an hour. However, the new laws encouraged the pioneers to organise the first London to Brighton run, and this attracted no less than 54 competitors (including self-propelled bicycles), but, of course, nearly all were of Continental origin.

Naturally description of cars figures little in the pages, commercial production was still to start, but I did find a photograph of a " Wolseley auto-car " which was a three-wheeled contraption looking rather like a bathchair with two seats abreast. A photograph is given of a Lifu Post Office delivery van (steam) and there is also one showing two dissimilar Serpollet steam cars, which were obviously horse-drawn wagonettes, with the usual light artillery wheels in which the machinery had somewhere been concealed. It was a great loss to the steam fraternity when this unorthodox engineer died.

Reference was made to various plans of the smaller towns to instal electricity and also to the start on work for our first " tube "—The Central London Railway—another blow to steam ! Steam mill engines were, of course, still being constructed and a number of new ones are illustrated and described, but the old times were beginning to change.

Train lighting and heating was generally still primitive and the writer well remembers winter journeys from Shrewsbury to Euston with the old foot-warmers. These were about 2 ft 6 in. long 3 in. deep and 9 in. wide. When put in the compartment they might be hot, but in half-an-hour or so they certainly were not; still they could be replaced by fresh ones before the journey was over, and at the same station a man would walk along the roof of the coach removing the unlit lamps and replacing them with lighted ones.

The lamps were self-contained of course and not infrequently would have some loose oil swishing about in the bottom of the bowl, but even if the glass were clear they were hardly suitable for reading by. Special trolleys existed at the stations for handling these, as they could not be stood up but had to rest in a circular opening.

I think we were fairly contented in those days, not knowing the blessings in store for us in the shape of petrol fumes, packed tube trains, aeroplanes and sound-barrier bangs, but maybe the present generation might find it dull if they could be transplanted back to 1897. Time marches on, but a magazine of 60 years ago stirs up memories of old machines and old ways. ▣

SHOP AND LOBBY CHAT

This time a few hints on speeding up production

By L.B.S.C.

WHENEVER I tell anybody I have just finished some job or other or done a bit of experimental work, the first thing that usually comes back at me is "I don't know how you manage to do it all." Correspondence, telephone, personal conversation . . . it is just the same, and the suggestion has been made many times that a few notes explaining what seems to be an apparent mystery would be welcomed by followers of my locomotive-building instructions.

First of all, I would like to scotch some assertions that have been circulated in the past, namely that I employed others to do much of my work and took all the credit for it. One person even went to the length of stating that I kept my workshop for show purposes only! The fact that I don't entertain any strangers except in very special circumstances, and the only folk who have a "season ticket" are a very few personal friends, makes that statement ridiculous right away. Anyway, I'll state right here that these articles and the original pencil drawings that I send in with them are, as the pavement artist says, "all my own work"; I have never had the slightest assistance from anyone in my locomotive-building. I am a staunch believer in the old saying that if you want anything done properly do it yourself. Nuff sed!

Keep your workshop tidy

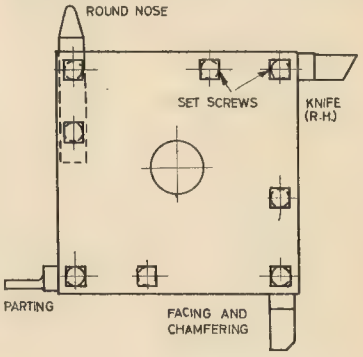
The first thing necessary for anyone who wants to do as much as possible in the minimum amount of time is to have a tidy workshop and *keep* it tidy. Certain scoffers have remarked that I must spend so much time tidying up that there is none left for doing any work. This is the exact opposite to the truth; I know of a certain party who can't be bothered to tidy up and, when on a job, can never recollect exactly where such-and-such a tool was last seen. He spends as much time looking for tools and material, as I should for doing the job! It needs only a simple system and an easily-cultivated habit to be able to put one's hand on any tool automatically, and to know where to look for any material needed. This is how I go about it.

My workbench, which is 5 ft long and has two drawers and two cupboards, is in one corner of the room; the window extends about halfway along the bench. Between the window and the end wall I fixed a big plywood panel, with another on the end wall itself—the full width of the bench. Each of these panels carries three toolracks. The upper two are just pieces of batten screwed on with row of nails projecting from each. The lower one has a double slot and a row of smaller nails on the front.

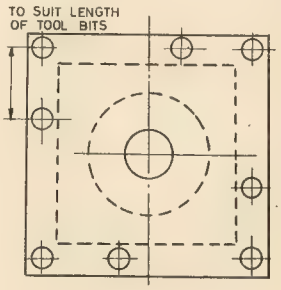
The nails on the upper racks are adorned with an assortment of small hand-tools, among which are three geared drillbraces, two hand vices, umpteen pairs of pliers of various shapes and sizes, two pairs of snips, three wirecutters, a "footprint" wrench, five hacksaw frames containing various grades of blades (one of which is set ready for side cutting), another Abrafile which cuts around corners, a miniature hacksaw and piercing saw, a large dieholder and tapwrench and a few more odds and ends. The slotted racks contain about 50 files of various shapes, lengths and grades, several screwdrivers, a set of handled taper broaches and what-have-you.

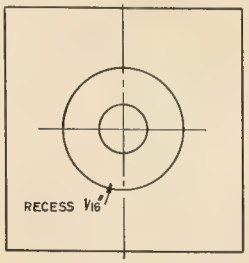
On the smaller nails are hung three steel rules, a gadget for holding small screws while being inserted, a big pair of dividers and other small items. Below the panel on the end wall is a narrow shelf supporting several wooden blocks with holes in them; these contain a complete range of small taps from $\frac{1}{16}$ in. and 12 B.A. up to $\frac{3}{8}$ in. all threads, including metric and clock threads.

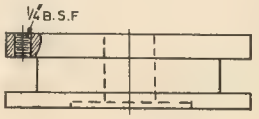
In the bench drawers are the heavier handtools: hammers, spanners, big screwdrivers (automatic and ratchet), a patent American archimedean drill which goes the same way whether the nut is pushed or pulled, tube cutter, Eclipse toolset, big files and so on. The cupboards contain castings and other material. On the side wall are



Above: Suggested tool set-up

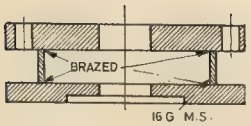




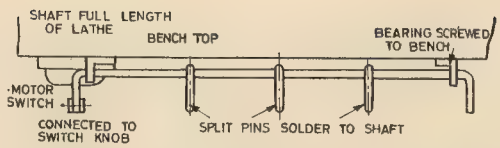


DIMENSIONS TO SUIT LATHE

Left: The turret made from a casting. The plan, underside and the side view



Left: A section of built-up turret



Right: Multiple-controlled switch

two shelves carrying boxes of dies and two nests of drawers with screws, bolts, nuts, rivets and washers. In these also are kept micrometers, squares, dividers, calipers and other measuring tools; pin-drills, small reamers, tool-makers' cramps, tap-wrenches and various other blobs and gadgets.

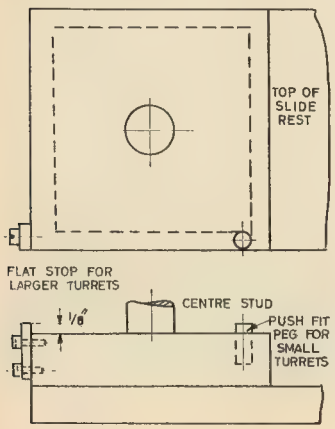
Now the point is just this: most of the tools are in sight, and the exact location is known of those that are not. It is thus the work of seconds to grab anything needed, without moving away from the bench; and I can assure all and sundry that it is easier to drop a tool into its proper place when you have done with it than throw it down on the bench, which soon becomes cluttered up. Tidiness thus becomes quite automatic and time is saved instead of spent. Try it !

The same system is applied to the machine tools. For instance, the Boley precision lathe on which I make all my small fittings is mounted with other machines on a long bench at the end of the room away from the window, and has a spotlight over it. At the back of it, on the wall, are shelves carrying the chucks, collets, sets of drills and other tools. The drawers below contain dies for use in the tailstock holder, gauges, and other accessories, and small lengths of rod material. The motor switch is on the bench sill, just below the top. On the edge of the bench I fixed a rod, full length of the lathe, with cranked ends. This runs in two bearings, and one end is connected to the switch handle. Three $\frac{3}{16}$ in. split-pins were threaded on the rod and soldered at equal distances apart, parallel with the end crank. I don't have to feel for the switch handle, as it can be operated by the end crank or any one of the split-pins—so no need to take my eyes off the job ! Everything belonging to the Milnes and Myford lathes is kept handy to them in the same way.

Swarf and filings on the floor ? Not on your life ! Nature made me broom-conscious, and I keep one handy. If any chips, drillings, turnings or filings drop on the floor, I don't tread in them and distribute them in the other rooms and on the stair carpet. I just take my broom and sweep them on to the boiler hearth (our central-heating boiler takes the place of the usual grate and heats the shop nicely), and I can pick them up when I clean the fire and throw the ashes away at night.

I guess this will explain why my workshop is always clean and tidy, and why I don't have to waste time looking for tools and material.

The turret stops



Mass production

I am neither afraid nor ashamed to say that I have not the slightest patience with those good folk who go to infinite trouble to mark out and set up the simplest of jobs " according to the book," thus wasting hours over a job that should be done in minutes. Even the Government is everlastingly crying out for productivity, and for the maximum productivity the job must be done at the highest possible speed. What's that ? Oh, yes, I have certainly heard of the saying " More haste, less speed "; you say that to an engine driver who prides himself on his time-keeping when he has been delayed on the road through no fault of his own or his engine. His reply will be . . . well, interesting, shall we say ?

Here is an example of what I mean. Someone, long since forgotten, wanted to bore holes through the ball ends of locomotive handrail pillars and suggested setting each up separately on an angleplate, centring the ball and drilling it with a drill in the tailstock chuck. That is, of course, the correct way, but life is too short for the time it takes. By aid of a simple jig the whole lot can be correctly drilled in less time than it takes to set up the first one on the angleplate, and get the ball to run truly, especially in $3\frac{1}{2}$ in. gauge size. Now there are plenty of jobs in small-locomotive building that lend themselves to mass-production methods, and I take advantage of them in every way possible, which explains why I can do the job quickly.

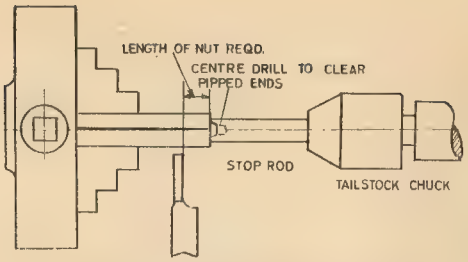
Take, for instance, simple things like union nuts. There are builders —I know more than one of them— who make all the nuts separately as the job progresses whereas I make a dozen or more at a time. Anybody who doubts the vast amount of time that can be saved even on one simple job should try making a dozen nuts separately, then try the following method and note the difference. Every lathe should be provided with a turret toolholder. I made those for my Milnes and Boley lathes; the Myford has two—supplied by the makers with the machine. This should carry a roundnose tool, a knife tool, a facing and chamfering tool and a parting tool. More about these later.

Now suppose we need a dozen or more $\frac{1}{4}$ in. × 40 union nuts made from $\frac{5}{16}$ in. hexagon brass rod. First, get your material and tools handy to the lathe; a piece of rod, a centre drill, a drill to suit the size of pipe for which the unions are needed (No 30 for $\frac{1}{8}$ in. pipe, No 20 for 5/32 in. and so on), a 7/32 in. drill, straight-fluted for preference, and a $\frac{1}{4}$ in. × 40 second tap. Most twist drills, when used for enlarging a smaller hole, have a tendency to catch up and jam in the hole, which causes them to slip in the tailstock-chuck jaws and usually results in bad scoring of the drill shank. Straight-fluted drills are much better-mannered.

A " second " tap will cut a sufficiently-deep thread in a union nut in one operation. The piece of rod can be as long as you like, if the hole through the lathe mandrel is big enough to accommodate it, which is the case with most of the small lathes now on the market. Make a stop for the 7/32 in. drill, like those I described for injector cone reamers—simply a piece of $\frac{3}{8}$ in. round rod about $\frac{3}{8}$ in. long, with a 7/32 in. hole through it and a 3/32 in. setscrew in the side—put this on the business end of the drill, at $\frac{3}{16}$ in. from the bottom of the cutting edges, and tighten the setscrew.

Alternatively grind a small nick on the drill at the same location, as I have done on the straight-fluted drill that I keep specially for the job.

L.B.S.C.'s SHOP AND LOBBY CHAT . . .



How to part off the union nut blanks

Put the rod in the three-jaw with about an inch projecting from the chuck jaws; face the end and then set the parting tool to cut off a full $\frac{1}{4}$ in. Put a piece of rod about $\frac{1}{4}$ in. dia. in the tailstock chuck; this should be centre-drilled at the end, so that any small pips left by the parting tool on the nut blanks will enter it and not affect the length of the nut blanks. Run up the tailstock until the rod in the tailstock chuck touches the rod in the three-jaw, then lock both tailstock and barrel. Part off the nut blank, pull the rod out of the chuck jaws until it touches the rod in the tailstock chuck, part off again, and repeat operations until all the length of hexagon rod has been cut up. Each piece will be exactly the same length. This is how I cut the blanks for injector bodies, ball chambers and other fittings.

One nut per minute

Lay the centre drill, smaller drill, larger drill, and tap in that order on the lathe bench or tray so that you can pick them up almost without looking. Set the chamfering tool in the turret—in the position for cutting. Then put a nut blank in the chuck jaws, centre it, poke the smaller drill clean through, run in the bigger drill until the stop touches the blank or to the depth of the ground nick, as the case may be. Run the tap in, either by sliding the tailstock or using the lever feed if the lathe has a lever attachment—my Boley has—chamfer the hexagon end, reverse in the chuck and chamfer the other end.

With a very little practice any average worker can turn out the nuts at one per minute. You get the knack of changing the drills and tap in the tailstock chuck quite easily. If a tailstock turret attachment is available, such as the Myford firm supplies, the tools can be mounted on that, and the union nuts turned out like greased lightning.

Well, there is just one example of how I manage to do it all. In everything I do I just try to combine system with common sense, and it pays dividends both in time saved and experience gained.

A four-tool turret

If you haven't one, get busy right away and make two or even three, unless you can afford to buy them ready for use. Wilwau supplies castings which need only chucking in the four-jaw, facing off top and bottom to suit any slide-rest, drilling for the central stud and drilling and tapping for the tool-holding setscrews. Use Allen screws for preference, which can be purchased at any tool store, or ordinary setscrews—or turn them from square or hexagon rod and caseharden them.

A turret can easily be built up, as shown, by using two pieces of steel plate cut square to a size to suit the slide-rest. The upper one should be about $\frac{1}{4}$ in. thick and the bottom one of sufficient thickness to bring the tools to the right height to suit the lathe centres. The centre part is made by bending a piece of 16-gauge steel to a square in the same way as the tank for a mechanical lubricator is bent. The lot is assembled and brazed as shown. The tools previously mentioned should be ground up from the short lengths of ready-hardened highspeed steel sold by tool dealers especially for the purpose.

One turret should be equipped with tools ground for turning brass, gunmetal and bronze, and another for iron and steel turning. It is very handy to have a third which can be set up for special work. A positive stop for the turret is necessary.

The Myford turrets have a ratchet stop arranged in a recess in the body of the turret, but there is no need to fit this on a homemade one. If the turret is smaller than the top of the slide-rest, drill a $\frac{3}{16}$ in. hole close to the edge and put a peg in it projecting about $\frac{1}{8}$ in. If the turret is same size as the top, screw a little piece of steel to the rest so that it projects above it to the same amount. When swinging the turret around simply lift it over the stop. ▣

ORNAMENTAL TURNING

THE attractive candlestick illustrating this article is typical of the artistic work which members of the Society of Ornamental Turners can execute on their specialised lathes.

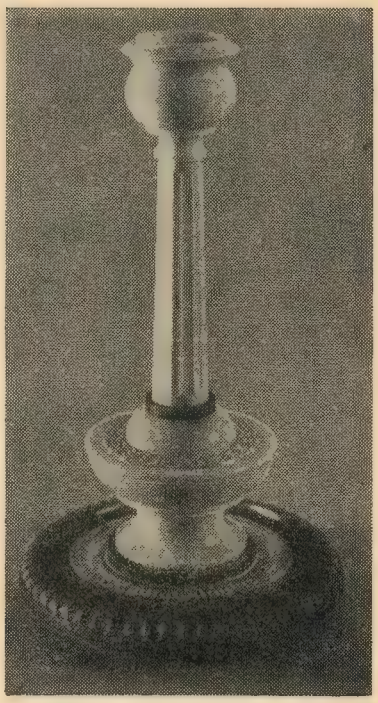
Making use of electro-typing inlays, the base is of African blackwood, $5\frac{1}{2}$ in. dia., the edge being fluted with the aid of a spherical slide-rest. The electro-type, which is recessed into the base, was made from a master fabricated from plastic, the actual design being concave V-cuts made with the horizontal cutter.

Copper to a depth of $\frac{1}{16}$ in. thick was plated on the master, the plating being subsequently removed and a stiffened brass disc soft soldered to the underside. This provided a flat surface parallel to the decorated side.

The outside diameter was turned true and a central hole was drilled to take the central screw which binds the assembly together.

A smaller electro-type was made with the slide-rest used in mechanical engineering. This also had a brass disc soldered to its underside and it was machined and let into the recess turned in the ivory bowl from which the tapered stem springs.

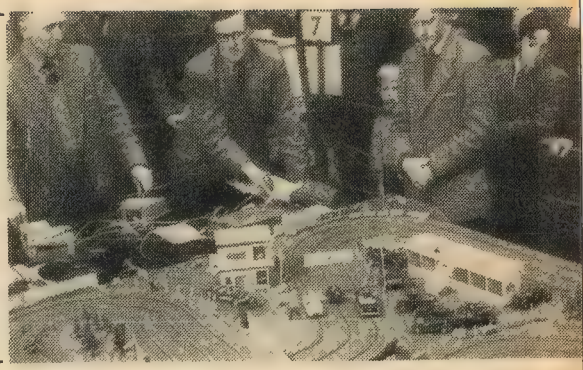
The concave and convex turning on the stem was produced with the spherical slide-rest, as was the cup which holds the candle.—L.B.H. ▣



This kind of work is best done with the aid of a spherical slide-rest

NORTHERN MODELS EXHIBITION

JOSEPH MARTIN visits the North's model engineering show of the year and discusses the work he saw



EVEN more interesting than the variety of works displayed at the Northern Models Exhibition in Manchester was the variety of occupations represented by the modellers.

It might be thought that in the North of England, where life moves to the rhythm of machines and the smoke of the First Industrial Revolution is breathed in every street, the model engineering fraternity would consist very largely of craftsmen from factory and mill.

The ninth exhibition organised by the Northern Association of Model Engineers, which represents 33 clubs and about 700 individuals, did little to confirm this assumption. On the contrary, it proved that modelling exercises the same width of appeal throughout the North as in other parts of Britain.

Among the exhibitors at the Corn Exchange were a doctor and a window-cleaner, a plumber and a pharmacist, a teacher and a shorthand typist, a commercial artist and a licensed victualler. The plumber contributed, not an engine of some kind, but a racing yacht; and what the doctor prescribed for his scanty leisure was a hand shaping machine and machine vice—it earned him a first prize—while a machine tool fitter, who might have been expected to send a machine tool, had enjoyed the holiday of constructing a model aircraft. So far as I could discover, only one modeller at this exhibition in Cottonopolis described himself as a cotton spinner—and his exhibit was a D.H. Mosquito.

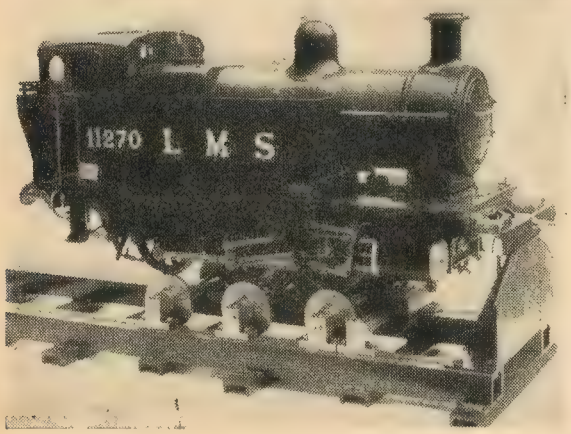
By the time that one had noted entries from shopkeepers and civil servants, clerks and decorators, it came as a surprise to find a *Britannia* in course of construction by a British Railways fireman-driver, S. E. Rowland of Urmston, and a power-flying aircraft built by an aircraft stressman, J. O'Donnell of Salford, who competed in the rubber-driven class.

It was the pharmacist, E. Younghusband of Swinton, a member of Eccles M.E.S., who won the coveted first prize for a locomotive. His 5 in. gauge L.M.S. 0-6-0 *Twin Sister* showed a care in the detail of its finish that did complete justice to the beautiful skill of its construction. Here was a dock shunter which had all the odd lovableness which we find in our humble tank engines, and for that reason too it was pleasing to find her winning the *Evening Chronicle* Trophy for the best locomotive model and the N.A.M.E. Members Trophy for the best exhibit by a Northern Association modeller.

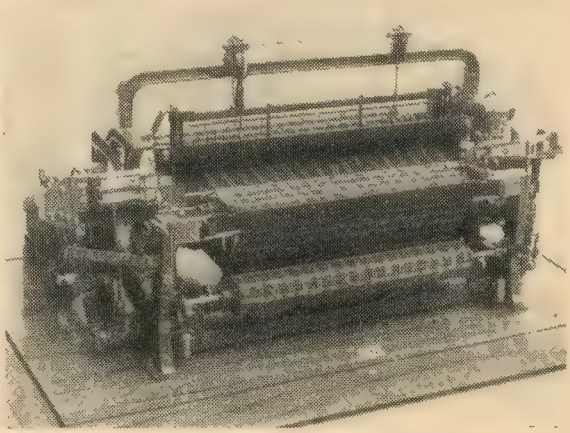
So much for the chemist. Second to him in the prize-list was an electrical engineer, A. F. Stevenson of Prestwich, a member of Whitefield and District M.E.S., who exhibited a noble, black 3½ in. gauge 4-6-0 L.M.S. mixed-traffic locomotive.

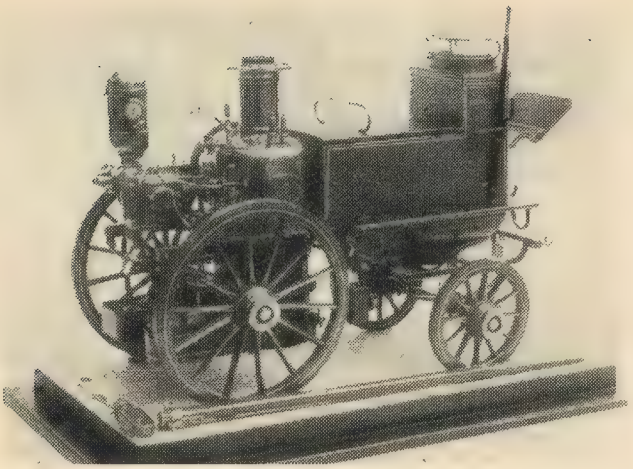
No one will be surprised after this to learn that the winner in the class for uncompleted locomotives was a paper worker. When D. Wolfenden of Rochdale has finished the chassis for his stately *Duchess* he should have a locomotive of which any live-steamer would be proud; and mean-

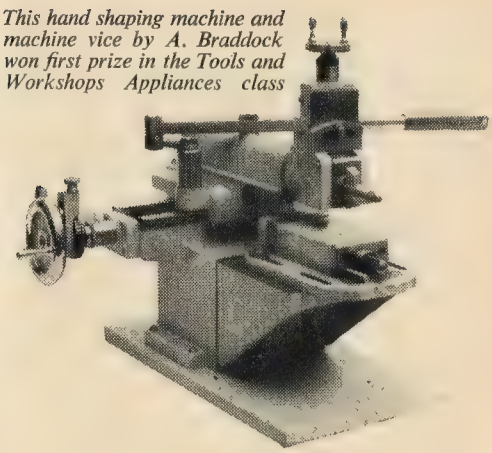
E. Younghusband's 0-6-0 TWIN SISTER *which won the first prize for Class I locomotives*



First prize for general engineering models went to T. W. Millard for this 2 *in. scale model of a Dobcross underpick tappet loom*







This hand shaping machine and machine vice by A. Braddock won first prize in the Tools and Workshops Appliances class

while he has the judges' opinion at Manchester to encourage him.

He was followed in the prize-list by an entrant rather vaguely described as a "representative"—J. R. B. Wilson of Fallowfield whose L.B.S.C. *Doris* looked elegant and powerful. Mr Rowland, the fireman-driver, came third with his impressive *Britannia*. All this work was to $\frac{3}{4}$ in. scale.

The $2\frac{1}{4}$ in. scale Fowler road locomotive by R. S. Jaques of Boston was a work that every MODEL ENGINEER reader would like to see. Everyone admired it, and Mr Jaques was awarded the Myford Trophy for the best exhibit in the show as well as the N.A.M.E. Trophy for the best general model.

Once again, all the other road locomotives were dwarfed by Leander Formilli's three-hundredweight Fowler compound showman's engine modelled at a quarter the full size from drawings made from the original before it disappeared for ever. Mr Formilli, who lives at Sale and is superintendent in a rolling mill, planned his model 13 years ago, and it should be nearly finished when he retires next year.

Whatever the models that the men of the North choose to build, there should always be at least one loom in an exhibition at Manchester. A modified Dobcross Underpick tappet model at 2 in. scale won a first prize for T. W. Millward of Fallowfield, a carpet manufacturer. Here, then, we had a model and a modeller who were close to the Manchester tradition.

J. S. Bodell's modern carbonating machine, remembered from the last Model Engineer Exhibition, obtained a second prize, and a similar award expressed the pleasure which Edgar T. Westbury and his fellow judges found in the 3 in. scale Francis Barnet *Falcon* by L. Tatlock, a Kearsley textile engineer.

Mr Tatlock made every part of the machine, including the tyres, and all of it was brilliantly fashioned down to the tiniest detail of the licence. Confronted with such exquisite work, some of the visitors thought that they detected a pathetic mis-spelling of the word "Villiers"; I hope they looked again, more carefully. It was hard luck that this model should be in the same class as Mr Jaques' obvious masterpiece.

A loan entry to the exhibition was this 2 in. to 1 ft working model of an 1896 Merryweather London Fire Brigade fire-engine

Kenneth C. Howard of Manchester also had to meet heavy competition when he entered his two $3\frac{1}{2}$ in. gauge Blackpool trams as mechanically-propelled road vehicles. While he failed to win a prize, his large, gay, brightly-lit tramway was one of the attractions of the show. His electrical work was, I think, better than his model engineering.

The generator-controller which he had built of wood and aluminium had 13 dials, 12 switches, five rheostats and 19 coloured lights and was altogether an impressive piece of work, but the trams themselves looked rather crude against the brightly-lit tower and its surroundings. Mr Howard is a man of versatile gifts.

The most attractive new exhibit for the public was undoubtedly the model race-car track introduced by Sale Aero and Model Club. "Three of us began it," said secretary Graham Barnes. "When the rest of the club saw what we were doing they joined in with enthusiasm."

The OO gauge track was laid on hardboard measuring 8 ft × 6 ft, with enough distance between centres to accommodate wider cars than usual. Curving through a pleasant landscape, the cars were a constant thrill for the young visitors at the Corn Exchange. Next year the boys and girls will look for them again; together, of course, with the demonstrations of radio-controlled models which can always be expected from the Manchester group of the I.R.C.M.S. The fire brigade had to be called to deal with a leak in the marine tank, but there was never any leak in the interest shown by the public.

Thanks to engineering, Manchester is a port. I found a briny veteran of the Horn, Captain Frank Taylor, admiring the ship models on view. J. Clayton of Whitefield had made a number of tiny antique vessels, among them *Golden Hind* and *Mayflower*, and fitted them cleverly into electric light bulbs. But cleverness is not enough, and there was more satisfaction to be received from W. Browse's two gaily-coloured narrow boats. Mr Browse can also turn out a schooner of beer: he is a licensed victualler.

One of the other competitors in the ships section was showroom manager M. J. Hards of Southport, who well deserved his first prize. Fixed to a base representing the sea, his aircraft carrier and destroyers communicated a sense of speed and majesty.

A shopkeeper and storekeeper were also successful with their ship models. The shopkeeper, J. Middleton of Manchester, had taken great care with the detail of his *Bounty*, and the storekeeper, W. Nattrass of Manchester, winner of the Hobbies Cup, had similarly found an inspiration for his great skill in another old favourite, the *Cutty Sark*.

From Shipley in Yorkshire Frank D. Woodall, a photographer, contributed a Western River towboat which headed the class for working powered vessels. When I first saw an American towboat I was surprised to discover that it did not tow; it pushed. Mr Woodall's model was of

this type, with three Western River boilers to supply the steam.

There were also some promising ship models from the juniors in a class led by D. Cornwell of Sale with a Bermuda sloop. It is a special pleasure in these days to find a schoolboy working on a ship model—or on a locomotive, like A. P. Bowers of Flixton.

Aircraft submitted by the young and the less-young (there was a handsome *Sabrina* whose vital statistics were of enormous interest) enhanced the show enormously; without them the Corn Exchange would have looked rather bare.

The handicraft exhibits provided colour and interest, and the N.A.M.E. can again be congratulated on including within the scope of its exhibition work which falls outside the strict category of model engineering. Trade exhibits also added to the liveliness of the background.

No model engineering exhibition can be a complete success unless people are constantly doing things. There was always something in progress at the Corn Exchange. F. Pain of High Wycombe, for instance, was showing the public how wood is turned by an acknowledged master; R. Blackburn of Bolton was engraving and making small plastic brooches; and hands were always busy at the N.A.M.E. workshop.

Fred Haynes, as usual, seemed to be everywhere at once, and was smiling every moment. To him as chairman of the committee, and to E. Axon as exhibition secretary, the N.A.M.E. owes much of its success in printing its name big on the Manchester calendar.

There are many other people and many other models—including several masterly loan exhibits—that I would have liked to include in this survey. With apologies to the huge L.S.W.R. locomotive of 1926, the little *Novelty*, the Merryweather steam fire-engine, the Greenly undertype and overtype engines of 1904, the Heywood collection, the patterns for castings used in the Jolly loom—with apologies to all the exhibits which deserve mention, I pass on to the incredible Mr Clegg, the authority on dialect, whose contributions were the most interesting in the whole exhibition.

When no one was looking, Mr Clegg slipped in a couple of time-bombs. He did not have to wait long for the first explosions of astonishment. One example of his craftmanship was a musical box containing bells, drums and a tiny pipe-organ. The other—a single masterpiece at a time would never satisfy the Renaissance zest of Mr Clegg—soon had the spectators discussing it like a Royal Academy problem-picture. It was a clock surmounted by a statuette and a pendulum. The statuette could be lifted off and there appeared to be no connection whatever between the pendulum and mechanism. Yet the pendulum controlled the clock.

How was it done? I leave the problem to the experts who keep time with Mr C. B. Reeve. ▣

Second prize in the non-working ship models was won by J. Middleton with this model of the BOUNTY

PRIZEWINNERS

LOCOMOTIVES—**1.** E. Younghusband, Swinton, 5 in. gauge 0-6-0 tank; **2.** A. F. Stevenson, Whitefield, 3½ in. gauge L.M.S. Class 5. Uncompleted locomotives or parts—**1.** D. Wolfenden, Rochdale, ¾ in. *Duchess*; **2.** J. R. B. Wilson, Manchester, ¾ in. L.M.S. Class 5; **3.** S. E. Rowland, Urmston, ¾ in. *Britannia*.

MARINE MODELS, WORKING STEAM OR POWER BOATS—**1.** F. D. Woodall, Shipley, Western River towboat; H.C., N. Graham, Altrincham, launch *White Witch*. Non-working models and miniatures. **1.** M. J. Hards, Southport, aircraft carrier and destroyers; **2.** J. Middleton, Manchester, *Bounty*; **3.** W. Browse, Monton, with two entries—both narrow boats. Galleons from Hobbies kit. **1.** W. Nattrass, Manchester, *Cutty Sark*. Working model yachts and sailing ships. **1.** D. Greeves, Middleton, Yacht; **2.** C. Redfern, Salford, 36 in. R Class racing yacht. Uncompleted models. C. C. Rhodes, Bradford, ¾ in. royal barge.

GENERAL MODELS, ENGINEERING.—**1.** T. W. Millward, Manchester, 2 in. Dobcross Underpick tappet loom; **2.** J. S. Bodell, Sale, modern carbonating machine. Mechanically-propelled road vehicles. **1.** R. S. Jaques, Boston, 2¼ in. Fowler road locomotive; **2.** L. Tatlock, Kearsley, 3 in. Francis Barnett *Falcon* motorcycle. Radio-controlled, except aircraft. S. Glover, Denton, launch.

ANY OTHER EXAMPLE OF WORK.—**1.** D. W. Holden, Todmorden, violin; **2.** F. Flint, Stretford, 16th century flintlock pistol.

TOOLS AND WORKSHOP APPLIANCES.—**1.** A. Braddock, Oldham, hand shaping machine and machine vice; **2.** W. R. Charles, Manchester, drilling machine; **3.** W. D. Thompson, St Helens, built-up lathe bed.

JUNIORS, ANY MODEL EXCEPT AIRCRAFT.—**1.** D. Cornwell, Sale, Bermuca sloop; **2.** G. Pearce, Stockport, two entries, vice and drilling machine; **3.** M. Innes and J. Innes, Prestwich, both cabin cruisers. Aircraft. **1.** N. Davies, Heywood, Focke-Wolfe; **2.** M. Allen, Salford, control-line stunt model to own design; **3.** E. Horrocks, Middleton, pylon model to own design.

AIRCRAFT, POWER FLYING MODELS (not rubber-driven)—**1.** G. Hankinson, Altrincham, 45 in.-span free-flight model; **2.** J. O'Donnell, Pendleton, 36 in.-span *Peter Pan* jet; **3.** J. O'Donnell, 50 in-.span *Eureka*. Rubber-driven. **1.** J. O'Donnell, *Headline*; **2.** H. O'Donnell, Salford, *Pontoon*.

FLYING SCALE MODELS—**1.** I. Cameron, Ellesmere Port, 36 in.-span, American Wittman *Butterfly*. Sailplanes. **1.** W. S. Neild, Cheadle, 68 in.-span A2; **2.** M. A. A. Beckett, Crewe, 40 in.-span, *Invader*. Scale control-line models. **1.** D. Morrey, Crewe, Hawker Tempest Mk. II; **2.** J. Laycock, Nelson, Messerschmitt 110C7. Other than scale. **1.** C. Hollowood, Nantwich, 42 in.-span twin-engined *Venture*; **2.** R. H. Pilling, Prestwich, 42 in.-span stunt model. Static scale models. **1.** H. Parrish, Denton, D.H.1A biplane; **2.** M. J. Hards, Bristol F2B fighter; **3.** H. Gandy, Northwich, Bristol Brigand. Radio-controlled. **1.** G. M. Tipton, Wythenshawe, 68 in.-span American Barnstormer type; **2.** A. S. Bailey, Cheadle, 80 in.-span to own design.

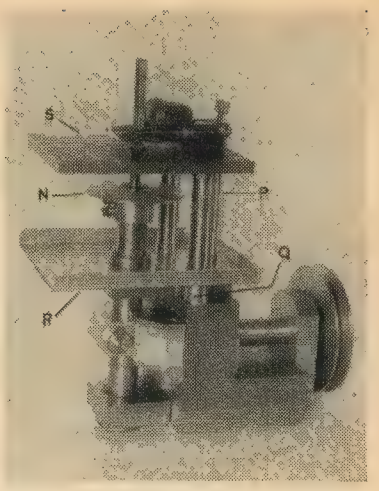
HANDICRAFTS—**1.** C. C. Rhodes, Bradford, turned wood fruit bowl; **2.** Mrs Kenworthy, Salford, feltwork firescreen; **3.** M. Chorlton, Manchester, embroidery willow plaque. Marquetry. **1.** A. F. Fisher, Manchester, "Native Dancer"; **2.** W. J. Farenden, Pendlebury, coffee table; **3.** N. Gray, Sale, and P. J. Blake

TROPHIES—Myford Trophy for best exhibit in show and N.A.M.E. General Models Trophy, R. S. Jaques; N.A.M.E. Members Trophy for best exhibit by a N.A.M.E. modeller and *Evening Chronicle* Trophy for best locomotive model, E. Younghusband; N.A.M.E. Marine Trophy for best marine model, F. D. Woodall, Shipley; Lawton Trophy for best exhibit by a junior, D. Cornwell; Harper Trophy for best exhibit in tool section, A. Braddock, Oldham; *Aeromodeller* Trophy for best exhibit in aircraft section, G. M. Tipton, Wythenshawe; Hobbies Trophy for best exhibit constructed from Hobbies Kits, W. Nattrass. ▣

EXPERT'S WORKSHOP

A lathe filing attachment

A further instalment by Duplex



TO COMPLETE the assembly of the reciprocating parts the swarf deflector, *N*, is secured to the upper end of the spindle carrying the machine file. When the machine is in operation some of the filings must necessarily pass through the gap formed in the work table and fall on to the deflector whose purpose is to catch the swarf and divert it into the chip tray.

If the filings are not deflected in this way, they will enter the spindle bearings and cause unsatisfactory working of the machine as well as rapid wear of the moving parts. The importance of keeping the bearings clear of swarf has been stressed because in the past some designs of machines of this kind have for this reason failed to give satisfactory service.

The deflector is best made of duralumin to lessen the work of machining and also to lighten the reciprocating parts with a view to reducing vibration. The part is bored to a wringing fit on the upper end of the spindle and is afterwards drilled to the clearing size for the two 2 B.A. screws that serve to secure the machine file in place. If, owing to an error in machining, the deflector is not a firm fit on the spindle it must be secured by means of a grub-screw.

THE SWARF TRAY

The tray, which is made of 20-gauge sheet aluminium, can be readily finished to shape by carefully beating it with a small mallet over a hardwood former.

When making the corner joints the two side members are first beaten over and the end is then cut to shape so that it can be turned in to make a neat, close-fitting joint.

The floor of the tray is marked-out in accordance with the dimensions given in Fig. 24 for the passage of the three pillar bolts and also for the $\frac{7}{8}$ in. dia. hole to fit over the flange of the upper spindle bearing bush. The latter hole was cut by using an adjustable hole-cutter mounted in the drilling machine and driven at low speed. It is advisable to make the tray a close fit at this point to make certain that filings cannot reach the working parts below.

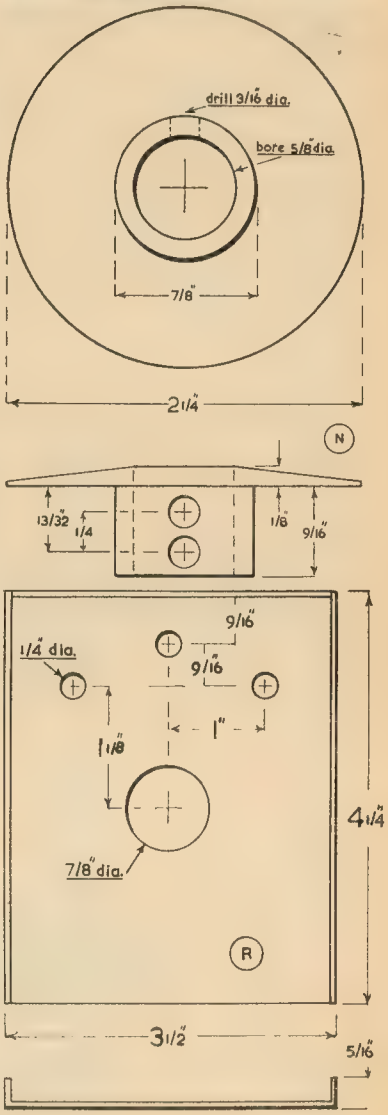
Top right: *Fig.* 22: *N, the swarf deflector*; *P, the pillar bolts*; *Q, the distance collars*; *R, the swarf tray*; *S, the work table*

Centre, Fig. 23: *The swarf deflector*

Below right: *Fig.* 24: *The swarf tray*

THE WORK TABLE

The work table is made from $\frac{1}{4}$ in. mild-steel plate and its exact size is immaterial, except that it should be made smaller than the swarf tray. This is to prevent filings being scattered on the lathe saddle. Both surfaces of the material are filed or machined flat and the edges are afterwards squared, for they may be used as datum faces when filing with the aid of a guide fence clamped to the work table.



The three holes for the passage of the screws securing the table to the pillar bolts must be marked out to correspond with those drilled in both the base casting and the swarf tray. The 2 B.A. tapped hole shown in Fig. 25 is best drilled at a later stage when fitting the special work holder, and the hole through which the machine file passes should not be drilled until the work table has been fixed in place. When machining the three pillar bolts, *P*; the $\frac{1}{4}$ in. dia. portion of the two outer bolts is made 1 in. in length, but for the central bolt this dimension is reduced to $\frac{7}{8}$ in. The latter bolt is raised by the upper bearing plate and the remaining bolts are brought to the same height by means of the distance collars, *Q*. To give a more finished appearance the pillar bolts are waisted and for the attachment of the work table their upper ends are drilled and tapped for the 2 B.A. fixing screws. In addition, spanner flats are filed on the upper ends of the bolts to enable them to be screwed firmly into the base casting.

Clearance reduced to minimum

The hole formed in the work table for the passage of the machine file has been made cross-shaped with a central circular bore; this allows a round file to be used or a flat file fitted either sideways or on edge. In this way the clearance is reduced to a minimum and the work is supported close to the face of the file.

As it is important to locate the hole for the file accurately in the work table, the following method of marking-out was adopted. The central portion of the underside of the table was painted with marking fluid and a marker was made by turning a short length of $\frac{1}{4}$ in. round rod to a sharp point. With the marker mounted in the spindle in place of the file, the lower end of the spindle was lightly tapped with a mallet to drive the marker against the table. By using this direct and reliable method the hole centre was accurately marked out for drilling and filing to shape.

After the table has been secured to the pillar bolts with 2 B.A. cheese-head screws, the machine can be given a trial run when secured to the lathe cross-slide by a single T-bolt. The T-bolt illustrated in Fig. 28A is suitable for the large slots milled in the cross-slide of the Drummond lathe, but for the Myford ML7 lathe the bolthead is made to the dimensions shown in Fig. 28B. As the topslide of the Drummond lathe is firmly secured to the saddle with only a single T-bolt, this form of attachment can be relied on in the present instance.

Efficient speed of machine

The machine was found to file efficiently when running at about 400 r.p.m., which speed approximates to that of the lathe mandrel when in middle direct gear. The driving pulley is, therefore, made to the same diameter as the pulley fitted to the crankshaft of the machine. The lathe pulley can be mounted on a short spindle for gripping in the self-centring chuck, and the two pulleys are aligned by adjusting the position of the saddle; in addition, the short V-belt is set to the correct driving tension by feeding the cross-slide outwards.

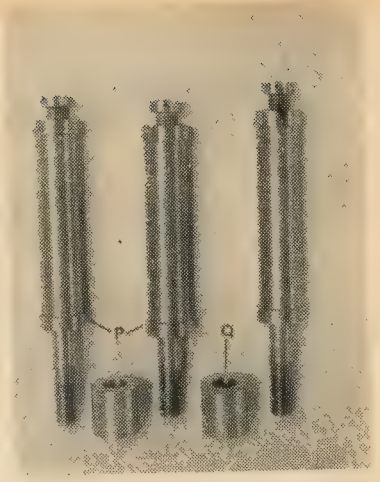
If required, the machine can be run at much higher speeds without vibration becoming noticeable, but the rate of filing does not appear to increase correspondingly and the rapid up-and-down motion of the file tends to thrust the work out of contact with the file teeth.

Tendency to lift

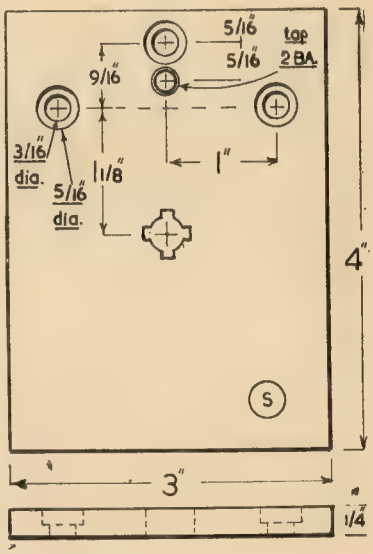
When the machine is in operation it will be found that on the upward or idle stroke the file has a tendency to lift the work away from the table. To counteract this the work holder illustrated in Fig. 22 is fixed to the table and its action is similar to that of the pressure plate fitted to a jig-saw machine or the pressure foot of a domestic sewing machine.

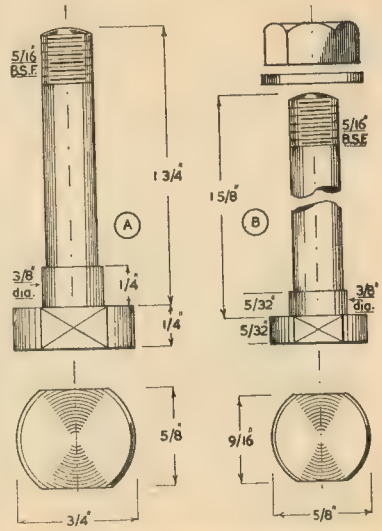
The construction of this accessory will be described in the next article of this series.

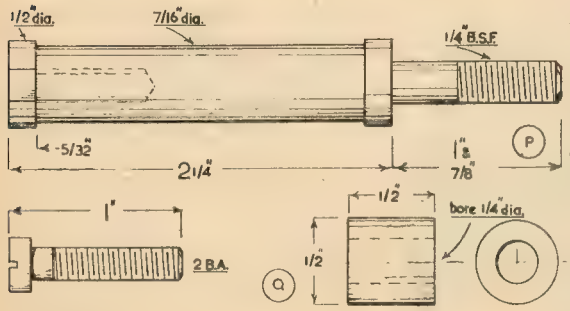
● *To be continued*



Above, Fig. 26: The pillar bolts, P, and the distance collars, Q







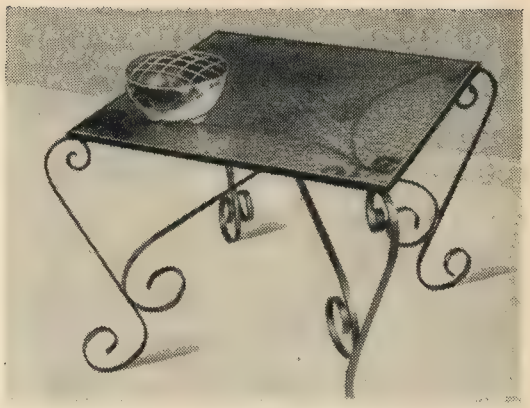
Above right, Fig. 25: The work table

Right, Fig. 28: The attachment T-bolt. A for the Drummond lathe and B for the Myford ML7 lathe

Left, Fig. 27: Work table pillar bolts and distance collars

Craftsmanship in the modern school

The educational system of co-ordinating theory and practice is discussed here by BRITANNICUS



The ornamental bent ironwork table with Arctic glass top

AT INTERVALS, most interesting articles on technical education appear in MODEL ENGINEER. Such a subject cannot be adequately covered in one book, much less in one article, and in any case MODEL ENGINEER does not set out to be a journal of education.

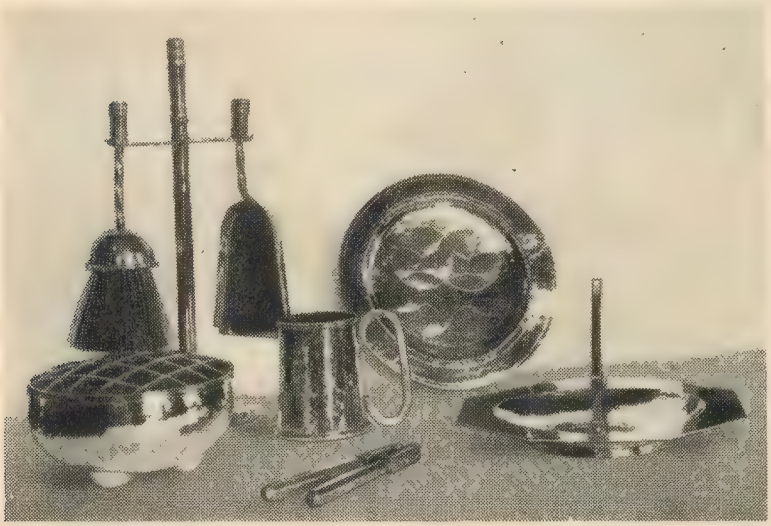
Bearing this in mind, I submit this account of an experiment in education, and let us not forget that in the main the students of technical colleges and evening institutes are drawn from the modern schools—the grammar schools existing to provide the more academic training.

In the twenties, Sir Henry Hadow, as chairman of a committee on education, issued the famous Hadow Report. Here, we have neither the space nor the need to give a résumé of this document, but *one of the results* on which the conception of the modern school is really based was the provision of a number of selective central schools.

I served for many years in one of these and watched and took part in an experiment in education. Pupils were selected by the notorious and much maligned eleven plus examination; the top percentages went to grammar schools, and the next best came to us. The remainder, passing into the senior schools, took the usual training of those times.

In our central school, guided by the very able headmaster, J. D. Allen, M.A., and after some time of trial, a two-stream system was adopted—technical for boys and commercial for girls. (We had at first an academic stream as well.)

Further examples of the ornamental metalwork produced by the students



At the close of Hitler's war, I was in charge of the physics and applied science side of the work, while a colleague, works trained, conducted technical and machine drawing classes, and two other men with industrial experience taught metalwork and woodwork. A university-trained member taught mathematics.

Briefly, the courses for the first two years were general in character, though they included technical drawing and woodwork. In the third year boys were definitely (and, to judge by results, successfully) given a "bias" towards technical training culminating in the sitting for the Preliminary National Certificate First Year Exam.

In the fourth year this training included metalwork in a very well-equipped workshop shared by us with another school and presided over by my friend and erstwhile colleague, Mr B. Ramshaw.

Draughtsmen and engineers

This led to the Second Year Junior Exam. Most students left school at the end of this year to become apprentice draughtsmen and engineers. Their later prowess is reflected in the results of technical institutes and colleges and in some cases universitites. Some remained a fifth year to take the First Year National Certificate Examination in mechanical or electrical engineering.

I hope readers will not think this detail too academic. Think of the subjects taken by these boys of 14, 15, and 16 years: English, mathematics, applied physics, simple mechanics, the theory of machines, and applied heat and electricity were subjects covered in my own department; technical and machine drawing, by Mr E. Horseley and later by Mr T. Dunn; woodcraft by Mr W. F. Swainston (an exceedingly high standard was reached); and finally Mr Ramshaw's metalwork class. A grand example of teamwork!

The metalwork shop was—and is—quite well fitted up; it possesses forges for light blacksmithing, several ½ in. capacity and one larger hand bench drills, a ½ in. capacity precision power drill, and a Myford ML7 lathe with most of the extras available. There are, of course, the usual hand tools.

Exceptional standard

Here, the basic training in workshop practice followed the usual lines of introductory training in processes and practices, leading up to lathework, small-tool making, gauge making and ornamental metalwork. Having some workshop experience (mostly amateur) myself, I believe that the standard reached by these boys, all under 17 and mostly under 15, was exceptional; remember that they did not undergo this training until the 14 plus year !

Squares, bevels, and gauges of extreme accuracy were produced, much of the work being up to exhibition standard. This was the direct result of the system of training: brain and hand; theory and practice together.

The illustrations show some of the ornamental metal work so popular with the parent. The napkin rings are in polished copper, engraved with a geometric design. These were the work of a boy under 15. The silk lined case, of solid mahogany, was made and lined by another boy a year older !

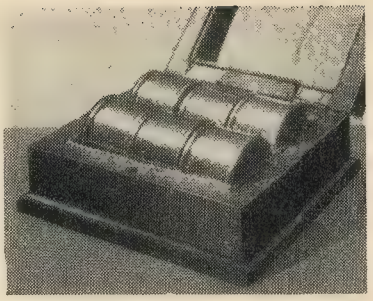
A gong was made in an unusual metal for gongs—iron. It sounded quite well, however. The rosebowl and tankard are in beaten copper with brass trimmings, the fireside companion set is brass, as are the cakedish and plate. The nutcrackers are silver steel. The bent ironwork garden table is fitted with a glass top cut from Arctic glass.

Misunderstood B.Sc. !

After more years of service than I care to think of, I left the Robert Atkinson School, Thornaby-on-Tees, two and a half years ago to take up once more the academic work in physics which I left long ago. (Oh, yes. I am one of those much misunderstood B.Scs ! I still retain the interest in this past work, and I have my own workshop, complete with ML4.)

The central school idea has been superseded now; my late school is no longer selective and the work no longer leads directly to technical qualifications. The woodwork and metalwork still go on, however, and rumour has it that there is now a model turbo-generator being worked upon. As holidays usually coincide, I have not been able to observe its progress.

So ended my connection with an experiment in education which lasted for a considerable period and made its mark on local ideas in technical training. In my belief, such forms of training, of both hand and brain, are necessary for the well-being of not only the individual but of the community. ▣



A set of napkin rings in polished copper, engraved with a geometrical design. The case is mahogany

Men — it's out of your hands!

Follow these simple instructions by Mrs. M. E. PURCELL of Australia and end that awful back-aching job of holding the wife's wool !

THE FEATURE on the mechanical wool-winder [MODEL ENGINEER, 7 July 1956] particularly interested me, as I have had a similar one (but with four arms) for many years. I got fed-up with the balls of wool supplied by shops and got down to making a wool-winder in my husband's workshop.

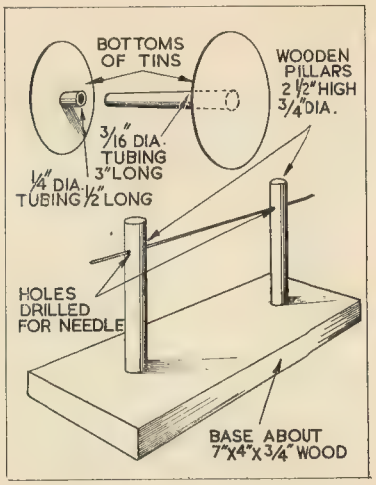
I devised a wool-holder which we gradually improved and the 20 or 30 friends who are using subsequently made models are all enthusiastic.

First, there is a wooden base 7 in. × 4 in. × ¾ in. The base is substantial because weight is needed against the pull of the wool. Two pillars, which can be made of ¾ in. dowel 2½ in. high, are fixed with centres about 4½ in. apart. They have a hole drilled 1¾ in. from the base, big enough to take a steel knitting needle with clearance to turn.

You will need the bottoms from two empty tins about 3 in. dia. (strictly a home-made job). Through one disc put a small length, about ½ in., of ¼ in. tube, and through the other a 3½ in. length of 3/16 in. tube. This tube is rigid. Give the whole a coat of paint to prevent any possibility of rust.

To assemble, put the 3½ in. tube through the wool, the ¼ in. tube closing over the end of the long tube. Insert a steel knitting needle (or you can be fancy and use steel wire and put a knob on one end) through the hole in one pillar, through the tube and then through the second pillar.

The wool will pull off very easily. The winder can be put on the table or the floor, or by keeping the pillar heights to a minimum, it can be kept in the knitting bag for use in trains or buses. ▣


BOTTOMS OF TINS
WOODEN PILLARS 2 1/2" HIGH 3/4" DIA.
3/16 DIA. TUBING 3" LONG
1/4" DIA. TUBING 1/2" LONG
HOLES DRILLED FOR NEEDLE
BASE ABOUT 7"X4"X3/4" WOOD

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

THE BIGGEST ASPIDISTRA

SIR,—I have often read articles and letters describing the "oldest" or "biggest" locomotive. I make the claim that the one mentioned in our own work's paper must surely be the heaviest built to date! It weighs 4,000 tons more than the *Queen Mary*!

To be a little more serious I would like to thank MODEL ENGINEER for countless hours of interesting reading. Although I am only an armchair enthusiast I read each copy from cover to cover and I gain not only considerable enjoyment from it but also assistance in my job.

Scunthorpe, Lincs. B. TOMBLIN.

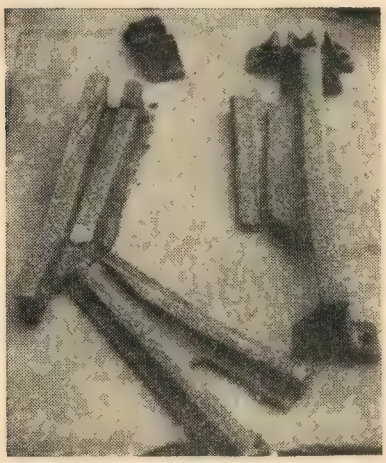
The house journal gave the locomotive's weight at 85,837 *tons! A misprint for* 85,837 *lb., presumably*—EDITOR.

RAILWAY RELICS

SIR,—My photograph shows relics of the original Stockton and Darlington Railway which passed through Eaglescliffe. These relics are at the local Preston Hall museum.

The items shown are the switches and points which are lying on the original stone sleeper with the chair and rail mounted.

Eaglescliffe, Stockton-on-Tees. J. STEWART.



Relics of the Stockton and Darlington Railway in the Preston Hall Museum

NEEDS BOOK ON PUMPS

SIR,—I have been a constant reader of MODEL ENGINEER for a number of years and I would be very grateful if you could put me in touch with one of your readers who could sell me a book on hydraulic motors and pumps. I have tried several second-hand shops and bookshops without success.

Roscommon, Eire. B. P. MASTERSON.

CLEANING BRASS

SIR,—The reply to E.H.N. [Readers' Queries, March 28] might be amplified somewhat.

In order to maintain the yellow colour of brass when cleaning in nitric acid, it is best to use strong acid and to plunge very quickly into the rinse; if the acid is dilute or if too long elapses before rinsing, the surface consists entirely of copper and the brassy appearance is lost.

The fumes of nitrogen peroxide evolved during this operation are exceedingly poisonous, and the work should be done out of doors.

As to the cleaning of aluminium, alkaline solutions are generally preferred. A good general purpose solution contains 10 per cent. sodium hydroxide (caustic soda) and may be operated at about 70 deg. C. This produces a pleasing etch. A whiter etch may be produced by use of a solution of 5 per cent. sodium hydroxide and 4 per cent. soldium fluoride, also about 70 deg. C.

If a black smut (due to the presence of alloying constituents, insoluble in sodium hydroxide) appears, this may be removed by brushing or by a swill in approximately 50 per cent. nitric acid, which does not attack aluminium.

All these "cleaning" treatments dissolve some metal and should, therefore, not be applied to parts where alteration of dimensions is not permissible.

Banbury, Oxford. R. POLFREMAN.

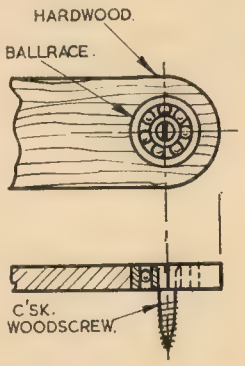
SPEED AND VELOCITY

SIR,—Mr C. E. Hooker is not correct in his assumption that speed and velocity differ only in rate. Speed is only rate of change of position and is merely measured in distance per unit time. Velocity is actually speed in a definite direction and may be plotted graphically, technically called a vector.

Navigators use this in plotting ships' courses. If an arbitrary unit of length is chosen to represent a certain value of speed then the velocity vectors of the ship and the sea may be plotted on their respective bearings. The line closing the triangle is called the vector sum or resultant and from it can be measured the true bearing and speed of the ship.

Velocity is one of the many technical expressions misused because their difference, not always subtle, is not understood and the user usually thinks that they sound better.

East Ham, E.6. A. E. CLAUSON.



The use of ball-races in a pantograph, as explained by E. Rudd last week

NUMBER, NOT PRICE

SIR,—I have to point out a minor misprint in my letter in Postbag, March 28. The educational pamphlet referred to is *Technical Electricity* 1/1, not 1s. 1d., as stated.

Glasgow, E.1. JAMES J. BROWN.

LOCO OF FUTURE

SIR,—Some time ago readers were treated to a good deal of correspondence on the subject of the locomotive of the future.

Might I suggest that as the *Virginia* series has now closed perhaps we could have details of such a locomotive.

It would seem unlikely that it will ever run on 4 ft 8½ in. gauge, but why not on 3½ in.? If my memory is

correct I think L.B.S.C. said he would be willing to give instructions for building *Queen Mabel*, about which we have heard a lot from time to time.

It would be a change to be working ahead of the full-size fraternity instead of years behind.

Edinburgh, 5. "AULD REEKIE."

THREAD CUTTING

SIR,—Recently, while thinking of the difficulties of cutting a multi-start thread in the average centre lathe, an idea occurred to me which I do not recall having seen mentioned before.

The idea is to clamp a thread chaser equal to the pitch of the thread to be cut in the toolpost and set the lathe up for screwcutting a pitch equal to the *lead* of the screw to be cut. For example, to cut a thread of 24 t.p.i., two-start, a chaser of 24 t.p.i. would be clamped in the toolpost and the lathe set up to cut 12 t.p.i.

This would ensure that both starts were identical in form and depth and would thus simplify fitting. It would of course have to be confined to V-threads unless a special form chaser were available.

I can only think of one snag to the method; it may lead to interference difficulties if the helix angle of the thread were great.

I cannot claim to have tried the method and it is possible that other snags exist. Perhaps one of your readers has used the method. It would be interesting to hear from them if they have.

West Bromwich, Staffs. G. BROWN.

USE FEELER GAUGES

SIR,—In MODEL ENGINEER for 20 December 1956, which has taken all these months to reach me, I read that a correspondent of Vulcan is having difficulty in obtaining suitable steel for pendulum suspensions.

Living at great distances from sources of supply, I had the same problem, and many substitutes were used without outstanding success. Finally, I bought for a few shillings at a hardware store a group of feeler-gauges, which have proved quite satisfactory. The quality and temper of the steel seems quite in order, though I have not yet heard any comments from qualified horologists.

Maruba, P. O. FLECKER.
North Queensland.

VICAR'S EXHIBITION

SIR,—I continue to be delighted with MODEL ENGINEER, and as one who has modelled ships, miniature railway locomotives, stock, 3½ in. live-steamers and made a clock, I find the magazine a well-balanced publication calculated to lead the beginner into a real enthusiasm and open for him ever wider fields for the use of talent which has often been latent too long.

A few years ago I ran a little exhibition in my workshop—to raise money for a church fund and encourage modelling in this district.

Huntly. (REV.) NEIL R. HENERDSON.

REMOVING ARBORS

SIR,—I wonder if I might come in on the question of removing drill chuck arbors, mentioned by W.C.W. of Birmingham [Readers' Queries, March 28]?

By far the easiest way is to drill a hole up the centre of the chuck body, put in a punch or piece of steel rod, and knock out the arbor.

I have done this on a number of Belco and Jacobs chucks, and it has neve done any harm. Use 17/64 in. drill for ¼ in. rod.

If your correspondent still feels uneasy, let him first drill a pilot hole of, say, ⅛ in. dia.

In regard to the suggestion for drilling and tapping the arbor end, there are three objections: first, a good arbor is often hard; second, the width of the tang does not permit the use of a very large screw; third, you sacrifice the centre hole.

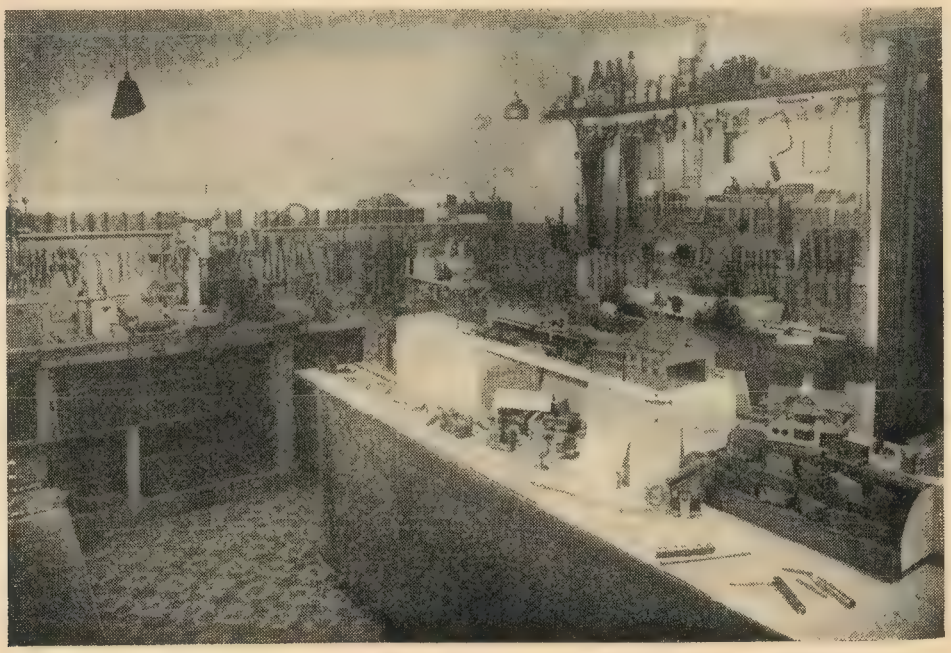
It surprises me that manufacturers do not provide this hole in their chucks as standard practice.

Ruislip, Middx. G. C. MOORE.

ROAD STEAMERS

SIR,—Vulcan's recent paragraph apropos steam wagons reminds me that another brewery, Shepherd Neame of Faversham, have also reverted to steam for their deliveries. In this case, however, I am informed that the vehicles are their own which had been taken out of service only shortly before the recent fuel restrictions.

I am of the opinion that steam propulsion on the roads has been



The workshop exhibition organised by Rev. Neil Henderson

used until quite recently much more than most people realise. To support this contention, consider the following list of vehicles seen in and around Southeast London in post war years, taken at random from memory.

1. London Transport used an old overtype wagon (I believe Foden) for tramway work. It used to operate between the Charlton Works and other tram depots, and possibly survived until the trams were scrapped in 1952.

2. Messrs H. V. Smith, civil engineering contractors, used to operate a road burning and planing outfit on what appeared to be a solid-tyred Sentinel.

3. Messrs Clark of Erith and 4. Tuff and Hoar of Woolwich (now British Road Services) both used steamers for general haulage as did 5. the Gas Light and Coke Co. (now North Thames Gas Board).

6. Another Kentish brewer, I believe it was George Beer and Rigden of Faversham, also had wagons visiting the London area, and one used to take water from the Kid brook at Kidbrook, S.E., regularly.

7. The South Metropolitan Gas Co. (now South Eastern Gas Board) for many years used steam vehicles for spraying road tar and these were, at least to the bystander, noticeably smooth running and silent.

I recall one occasion in particular when one of these tar-sprayers was climbing the hill from Blackwall Tunnel to the A2 road, followed by a post-war 1½ litre car of very famous make. Believe it or not, the car made more noise on the ascent, despite the tanker's full load *plus* a loaded trailer tank as well ! These particular vehicles now appear to have been replaced by the inevitable knocking, stinking diesels.

Unfortunately, I cannot say what the present position is with these old steamers as I have seen none of them since living in Surrey.

Old Coulsdon, E. T. BARR.
Surrey.

JOHNSON'S SINGLES

SIR,—Mr Maskelyne, in his article on Samuel Johnson's Midland Railway Singles [MODEL ENGINEER, April 4], has chosen for his illustration No 1855 of the second class as being the most numerous, whereas the most beautiful and symmetrical were the 7 ft 9 in. singles of the Princess of Wales class.

He does not mention that the latter were fitted with twin helical springs to the driving-wheels, which in my opinion enhanced their appearance, neither does he mention that the tender for the Princess of Wales was an eight-wheel tender carried on two bogies with inverted semi-elliptic springs.

The supplement to the summer number of the *Locomotive Magazine* for 1900 shows far better than any line drawing what a beautiful engine the *Princess of Wales* really was.

At speed, the inside singles always gave me the impression that they were gliding along the track, rather than rolling. An impression I have never been able to recapture with any other design.

Lee-on-the-Solent, W. F. THAIN.
Hants.

SIR,—J. N. Maskelyne mentions that these singlewheel engines and the Caledonian Railway No 123 were the only ones of the type to survive to become the property of British Railways after grouping.

Attention should be drawn to the fact that the six Pollitt 4-2-2 class built for the Great Central Railway were all working after the grouping. No 5972 was exhibit No 18 in the Darlington railway centenary in 1925.

Withdrawal dates were 971 in 1923, 970 February 1924, 967 August 1924, 5968 in 1925, 5969 July 1926, and 5972 September 1927.

Leicester. P. H. V. BANYARD.

PENDULUM CLOCKS

SIR,—Mr Pirrard's criticism of knife-edge and similar suspensions [Postbag, March 14] is valid only in cases where the amplitude of the pendulum's swing is *not* constant; it is equally valid in such cases for any form of suspension, for as far as I am aware there is no pendulum in use today which is not subject to circular error. However, if the amplitude of swing is constant the error is of no importance and the pendulum will maintain a close rate.

Huygens' cycloidal pendulum, although theoretically attractive, is of little practical value, and outside the Science Museum, South Kensington, there are probably no existing examples. In practice, therefore, there is little to choose between any of the forms of suspension mentioned by Mr Pirrard, although I would fight shy of using cords because the chance of moisture causing a gaining rate is very real.

Can any reader describe how to keep a pendulum swinging with a variation of amplitude less than one minute of arc over a period of 12 months ? If so, I am certain it would be of great interest to many of us. It seems probable that the answer may be found in a combination of gravity-arm and count wheel drive, arranged to leave the pendulum free, as for example in Sir David Gill's clock of 1880 which was constant to one second per month.

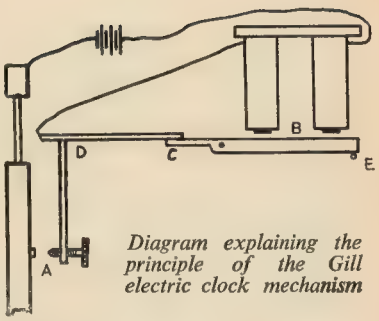


Diagram explaining the principle of the Gill electric clock mechanism

This class of electrical pendulum could quite easily be made in the amateur's workshop and should, in theory, be far superior to the Hipp pendulum, although it will use more electricity and be more expensive in the long run. But there is no merit in saving electricity at the cost of accuracy, and if the clock does not keep good time what is the value of it ?

The principle of Gill's clock is: the pendulum swings to the left and contact is made at *A*. This causes the armature to lift at *B* and drop at *C*. The gravity arm *D* drops and propels the pendulum until stopped at *C*. Contact is then broken at *A* by the continued swing of the pendulum; the armature drops against the stop, *E*, and *C* rises, resetting the gravity arm to await the next contact at *A*. An impulse is thus given at every swing of the pendulum.

The count wheel mechanism is not shown, but it is operated from the armature, not from the gravity arm.

Harlow, Essex. W. H. B. CLARK.

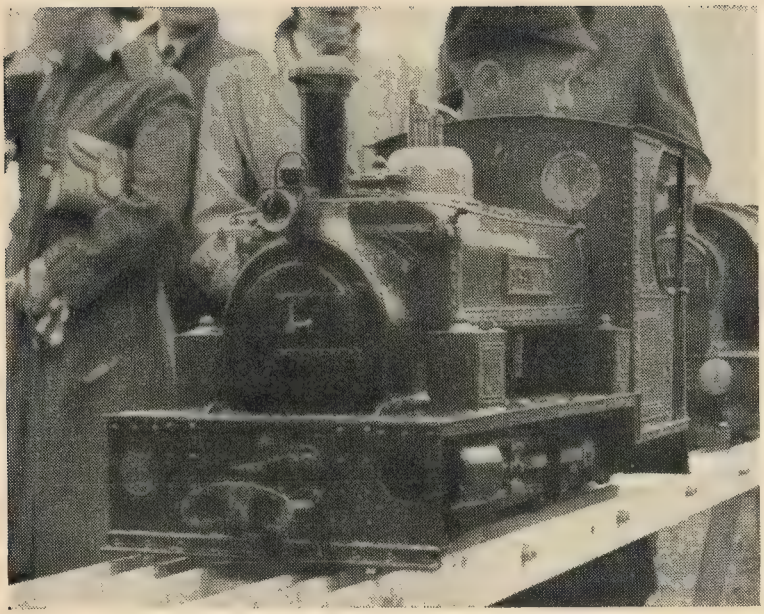
NARROW-GAUGE MODELS

SIR,—It is with some diffidence that I dare to disagree with Mr Maskelyne but, regarding his reply to John Bennet [Postbag, March 28] I feel I must do so.

It should be noted that a small engine built to a large scale will be no larger than a large engine in a smaller scale. For instance, my *Susie M*, whose photograph I enclose, is comparable in power and weight with a 5 in. gauge Atlantic, but with the exception of the cylinders most of the components are, if anything, smaller.

She was built with the aid of a 3 in. lathe which I purchased new in 1939 for the sum of 75s.; and in a workshop situated in the kitchen. The work took 875 hours, spread over two years, and cost just under £10. *Prince* would be about the same size and could be constructed by anyone who could tackle a normal 3½ in. gauge tender engine.

The industrial type locomotive is now quiie popular, the reason being,



SUSIE M, *an admirable example of narrow-gauge modelling*

I think, that an 0-4-0 tank engine is much simpler than an express type, and needs no tender. The absence of the latter makes transport and assembly on the track much simpler.

May I also press for the description in MODEL ENGINEER of *Prince* or a similar engine?

Holloway, M. EDWIN MOON.
London, N.7.

J. N. Maskelyne writes:

I did not, of course, intend to imply that nobody could tackle a job like this. I know SUSIE M *very well; but there are few people who would not have much difficulty in making a similar engine in the circumstances so successfully overcome by Mr Moon. I think* SUSIE M *herself supports my opinion; so do some other model narrow-gauge locomotives I have seen and handled.*

Has Mr Moon any idea how modern prices compare with those he quotes? Further than that, I am certain that the heavier frame cutting and plate cutting required in these large-scale narrow-gauge engines would be beyond the scope of many, but not all, "kitchen-table" workshops.

L.B.S.C.'s NEXT

SIR,—I was interested in Mr John Bennet's request [Postbag, March 28] regarding the next locomotive by L.B.S.C. According to Mr Maskelyne there are a few snags, so may I suggest another? What about a Prince of Wales class? Surely there must still be a few Nor'-West enthusiasts about. I believe L.B.S.C. himself put out the suggestion some time ago.

Hull, Yorks. L. WALKER.

'BEGINNER'S WORKSHOP' IN BOOK FORM

Workshop Hints and Tips, by Geometer. Published by Percival Marshall and Co. Ltd, price 3s. 6d. Postage 3d. if ordered from publishers.

A USEFUL collection of articles on workshop practice has been issued in handbook form, under the title *Workshop Hints and Tips*.

The articles are by Geometer and have been published over the past 18 months on various tricky operations faced not only by model engineers, but all who use a home workshop. The book represents extremely good value at 3s. 6d.

The handbook has been published in response to many requests by readers, who find numerous copies of MODEL ENGINEER unwieldy when they wish to refer to a particular article. Collection of the most useful of the Geometer articles into one handy sized volume will be very welcome to this class of reader.

It is only when one sees his articles in book form that one realises the range over which Geometer's lucid pen and splendidly clear drawings have ranged. There are useful hints on marking-off procedure, belt drives, roller chains and sprockets, springs and all their aspects, threads, repairs and replacements for pumps, cutting and fitting gaskets and many others.

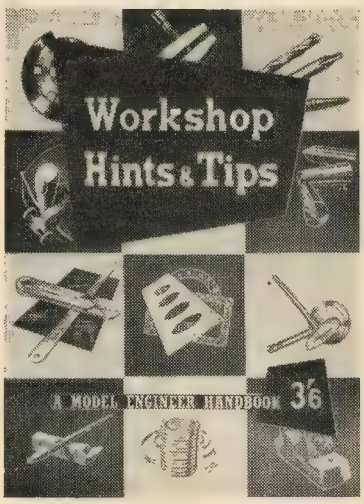
Competition of television

I feel that the foreword is worth quoting: "Despite the competition of television and other armchair amusements, the desire to do things for ourselves is strongly rooted. Sometimes it has a financial compulsion and in many cases it is simply the inborn urge to use our hands.

"Whatever the reason, much time, trouble and money can be saved if the knowledge and hints which are gained from long experience are readily available.

"This mechanical know-how must be at hand the moment it is needed and I believe that this handbook will go a long way towards meeting these requirements. 'Geometer' covers the identity of a professional engineer who has had many years of experience in differing types of workshops. He has put down on paper for the benefit of others many of the operations and processes whch gave him trouble when he first met them."

Some 60 subjects are covered in this handbook, which is extremely well illustrated, and it is confidently recommended.—S.G. ▣



READERS' QUERIES

Do not forget the query coupon on the last page of this issue

This free advice service is open to all readers. Queries must be on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling, cannot be given: stamped addressed envelope and query coupon with each query. Mark envelope "Query," Model Engineer, 19-20, Noel Street, London, W.1.

Three-cylinder loco

I am proposing to build a 2½ in. gauge *Olympiade*, and would like to know how to get the three cylinders operating at the necessary 120 deg. I realise, of course, most small locomotives are built with only two cylinders and, therefore, the 120 deg. setting is not often required.—W.V.C., Gisborne, New Zealand.

▲ *First of all set the driving wheels with their cranks at 120 deg. apart by using a 60 deg. set square instead of the usual 90 deg. The operation should, of course, be done on a faceplate, and the procedure would be as follows:*

Set one wheel with the crank exactly vertical, crank downwards. Then adjust the wheel at the other end of the shaft until the line through the centre of the crank and the axle slopes upwards at 30 deg. from the horizontal and 120 deg. from the other crank. The inside crank should now be adjusted until it is exactly halfway between the centres of the other two cranks on the major arc.

Some people might prefer to start with the inside crank arranged vertically and then set the two outer wheels with their cranks each 30 deg. below horizontal.

Locomotive safety-valves

I would be grateful for information on the construction of safety-valves for 3½ in. gauge locomotives. I can make them open, but I can't make them shut without the pressure dropping and a clip with the shovel.

The safety-valves on my first locomotive are commercial, the second I made myself to L.B.S.C.'s specification for *Heilan' Lassie*, making a special cutter for cutting the valve seats. They are both equally bad! I can get them to work on compressed air (within 20 lb. but not steam. I refer to the semi-pop variety. —J.H.U., Botley, Hants.

▲ *This trouble is quite a general one—although it does not seem to worry the drivers of miniature steam locomotives unduly. The plain fact is that these tiny valves are subject to a great deal of friction, which makes their operation slightly uncertain, and the defect has to be remedied by the application of human hand-power! Sometimes, however, they are perfectly satisfactory; it all seems to depend on the workmanship that is put into their manufacture.*

Driving on gas

I have read with interest the recent MODEL ENGINEER article on gas as an alternative fuel to petrol. I have already converted my car to run on bottled butane gas and I find the performance, with one exception, is equal to petrol. The sole trouble is freezing—which I encounter after about four to five miles. Can you help me?—S.R., Whetstone, London.

▲ *It is difficult to offer a solution to your freezing-up trouble. The system you use appears to be reasonably satisfactory—though it does not apparently give any automatic mixture control—but you do not state at what point the freezing up occurs. If it is in the induction system some form of hot-spot manifold or other heating device would probably provide a remedy. But it may be that the expansion of gas as released from the bottle causes freezing up either in the outlet valve or the pipe system, in which case local heating by exhaust or otherwise might be applied.*

A.c. generators

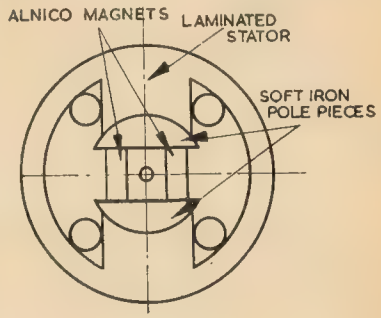
I would appreciate information as to the layout of alternating current generators of 3,600 r.p.m. (2 poles) using permanent magnets, such as Alnico, for the rotating field. I want to wind up something for a fairly steady output of at least 500 w.—preferably 1,000—and, of course, the 3,600 r.p.m. speed gives 60 cycles, 2 poles.

I intend to mount a bar magnet or flattened horseshoe magnet on the flywheel and have the coils stationary at minimum distance from the rotating magnets. (I did not especially want to build a machine with long-bar magnets in a case, like a regular alternator in miniature.)

I know the coils will have to have a laminated core, but how do I figure how big it should be?—G.R., San Mateo, Calif.

▲ *Definite advice cannot be given, as little data are at present available on the design of alternating current generators, including windings and output ratings. However, your suggestion of using a solid magnet on the flywheel running adjacent to the faces of the stator poles would not be highly satisfactory, as it would introduce a very undesirable end thrust—and this would obviously vary according to the load on the motor. It would be far more satisfactory to use a ring type stator so that the air gap would be at the circumference of the magnet poles and, thus, radial thrust would be balanced and no end thrust would be produced.*

The most suitable form of magnet would be a built-up assembly of the



Diagrammatic arrangement of a permanent magnet generator

H armature form, using two short-bar magnets with soft iron pole pieces, preferably laminated.

As to the supply of Alnico magnets, there are several firms in this country producing these including:

James Neill and Co. (Sheffield) Ltd, Composite Steel Works, Napier Street, Sheffield 1.

Swift Levick and Sons Ltd, Clarence Steel Works, Leveson Street, Sheffield 4.

Marrison and Catherall Ltd, Forncett Street, Sheffield 1.

These can also be obtained in sintered form (which facilitates the production of awkward shapes) from:

Murex Ltd, Rainham, Essex.

In order to produce 500 w. it would be necessary to use an engine producing about 1 h.p.—and if steam is supplied at 150-200 lb. pressure a Cygnet twin engine of 2 in. bore × 1½ in. stroke would be suitable.

CLUB NEWS

EDITED BY THE CLUBMAN

THERE can be no doubt that many people—perhaps a great many—who would be very happy in the model engineering movement are deterred from joining it, not by anything they dislike, but by what they appreciate and admire. Confronted with a first-class example of modelling skill, they feel that their own qualifications can never be other than negligible.

This is, of course, a mistaken attitude. Every club values skill and seeks to develop it in its members, but the first essential is enthusiasm, an intelligent and growing interest in the club's work and, usually, in some particular aspect of it—such as live steam or power boats.

It is possible to be a happy and useful club member with no more than this, but what often happens is that the newcomer finds himself painlessly acquiring a skill which he had imagined to be quite beyond him.

I am, therefore, glad to report that the second exhibition of **Ilford and West Essex Railway Club** has been designed, like the first, with the express idea of interesting those who under-rate their abilities and think that "very great skill is necessary for model making." The club hopes to show the public what normal care and handiness can achieve with only the simplest equipment.

Lord Brabazon of Tara, supported by Lord Northesk—both are model railway enthusiasts—will open the three-day show on May 2 with the Mayor of Ilford in the chair. The hours for the first two days are from 3 p.m. to 9 p.m. Then follows a full day with the doors open from 10 o'clock in the morning.

The exhibition is being held in Ilford Town Hall. A glimpse of what visitors will find there is given to us by secretary R. L. Riddle of 36 Vernon Road, Seven Kings:

"The big OO layout will be on show, of course, with slight modifications in track and scenery since its last appearance. But we shall have also two 'small-space' layouts by club members showing the possibilities of hand-made and commercial models fitted into odd corners. One of these two normally operates in a bedroom, while the other works well on a living-room floor.

"Those interested in O-gauge and EM-gauge models will find stands showing these, and again constructional ideas and methods will be exhibited. Scenery and buildings are quite easy to make, while simple jigs and the various kit systems on display may make you think that you could do quite well at the hobby."

This is the way to lure the outsider inside. Mr Riddle adds that the Festiniog will be exhibiting and that the Tramway Society will be running cars, appropriate to Ilford area, of the London tramway system.

To bring in new members and stimulate enthusiasm among the young, **Tonbridge Model Engineering Society** is this year awarding two prizes to members building the best model control-line aircraft.

At the annual meeting in the Carlton Cafe, Tonbridge, an excellent tea was served. "Despite this, or perhaps because of it," says secretary R. H. Procter (Roslyn, Coldharbour Lane, Hildenborough, Kent), "the various officers were re-elected under the chairmanship of H. H. Mills."

As an excellent beginning to the new programme, E. M. Granville demonstrated the hardening and tempering of steel and R. R. Turner, another member, spoke on the grinding of lathe tools. The meeting provided a useful instruction class especially for those who were new to the mysteries of the lathe.

I understand that members of **Leeds Model and Experimental Engineering Society** made some new resolutions when they visited Kirkstall Forge and had their first look at the furnaces.

"The approach to the forge," writes D. W. Boydell (20 Victoria House, Quarry Hill, Leeds 9), "put one in mind of Dante's Inferno, with the glowing furnaces reflected in the river and on the wet pavements." Once inside, the visitors came upon one absorbing incident after another as they followed the processes of stamping and forging.

So full of interest was the whole place that it was difficult to drag some of the members out of the reception room when they arrived! Around the walls, as though to welcome them as model engineers, were wonderful small scale models of the site showing its development from the thirteenth century to the present.

The main forgings were for heavy transport vehicles such as public service buses and goods lorries. This old English firm exports to the U.S.A. and Germany.

Leeds M. and E.E.S. had had to wait two years for the visit owing to the large number of requests. The outing gave an excellent fillip to the New Year programme which is now well under way. Anyone interested in model making is sure of a cordial welcome at the Salem Chapel on the first and third Tuesday in each month.

In the lighter evenings work will be continued on the track at Temple Newsam. Given favourable weather, the society should have locomotives running this year.

Southampton and District Society of Model Engineers is interested in attending Track Days which are held by various clubs throughout the year. The secretary, Michael Bray, of 42 Carlton Road, Southampton, would like to hear from other secretaries so that meetings can be arranged.

M.E. DIARY

April 26.—World Ship Society Merseyside Branch, films, headquarters, Liverpool, 7.30 p.m. Port Talbot, Neath and District S.M.E. informal night; I.M.E. Diesel Engine Lubricants.

April 27.—Model Railway Exhibition, Central Hall, Westminster (last day). S.M.E.E. lecture, "Lifts," B. P. Hutton of Marryat and Scott, 14 Rochester Row, London, 2.30 p.m. Glasgow S.M.E. talk on a White steam car.

April 28.—Glasgow S.M.E. visit to Milton of Cmapsie: White steam car.

April 29.—Glasgow S.M.E. visit to Hydepark Works of North British Locomotive Co.

April 30.—I.R.C.M.S. Hull Group, Sportscraft, Beverley Road, Hull, 7.30 p.m.

May 2.—Ilford and West Essex M.R.C. exhibition, Ilford Town Hall, 3 p.m., Lord Brabazon of Tara (May 2-4). Eltham and District L.S. "Boiler Brazing," A. L. Hutton, Beehive, 8 p.m.

May 3.—North London S.M.E. annual meeting, E.R. Gas Offices, New Barnet, 8 p.m. Rochdale S.M.E.E. "Chemical Engineering," L. Clegg, Lea Hall, 7.30 p.m.

Mat 8.—Sutton M.E.C. annual meeting.

Model Engineer CLASSIFIED ADVERTISEMENTS

Classified Advertisements together with remittance should be sent to Model Engineer, 19-20, Noel Street, London, W.1, by latest Thursday morning prior to date of publication. Advertisements will be accepted from recognised sources by telephone. GERRARD 8811. Ex. 4

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WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Workshop Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

Immediate Delivery from Stock, Myford "ML7" and "Super 7" lathes, Super Adept lathes, bench planers, shapers, electric motors, small tools.—F. W. KUBACH, 12, Sylvan Road, London, S.E.19. LIV 3311/12.

Drummond-Myford Lathe, V-drive, 1/3 h.p. Crompton motor, stand, clutch, steadies, vertical slide, many tools and accessories. Progress ⅜" drill, vertical motor Sawing machine as described and designed by "Duplex" with motor. Prefer to sell as one lot. Offers.—Box No. 8481, MODEL ENGINEER Offices.

Bargains in Drill Sets. 29 carbon twist drills 1/16" to ¼" × 64ths, £2 7s. 6d. or five payments of 10s. High speed, £5 15s. or six payments of £1. Complete with metal stand, 13 H.S. in metal box 1/16" to ¼" 16s. 6d. or four payments, 4s. 6d. Five auger bits in wallet, reduced shank to fit ¼" chuck, sizes: ¼", 5/16", ⅜", 7/16", ½", 11s. or 3 payments of 4s. Send for complete list. S.A.E.—WANSTEAD SUPPLY CO., 30, The Broadway, Woodford Green, Essex.

New Tools H.S. parallel hand reamers, 5/32", 7/32", 9/32", ⅜", 11/32", ⅜", six for 27s. 6d. C.O.D. 1s. 4d. Precision needle files, 8 assorted, 7s. No. 1 M.T. drill shanks, length 7", drilled ¼", 5/16", ⅜", set of 3 for 7s. 6d. Circular diestocks, 1 1/16", 3s. 6d; 1⅛", 4s. 6d. H.S. taps ⅜" × 26 t.p.i. Taper S. & P. 4s. each.—A. KING, 152, Halfway Street, Sidcup, Kent.

⅜" **High Speed** sensitive power bench drilling machine, £6 10s. S.A.E. details. Credit terms available.—WANSTEAD SUPPLY CO., 30, The Broadway, Woodford Green, Essex.

Plain Lathe, 2½", 10" centres, 4-jaw chuck, cross-slide, £12.—Newlands, Spring Gardens, Rayleigh, Essex.

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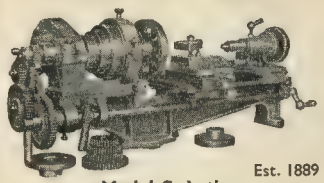
Buttermere Works, Sheffield 8



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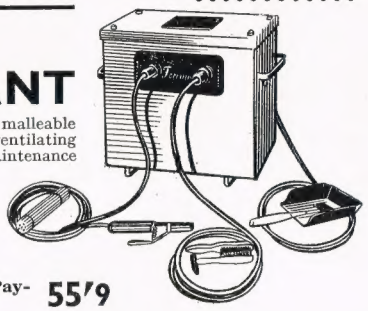

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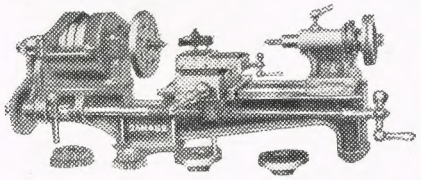

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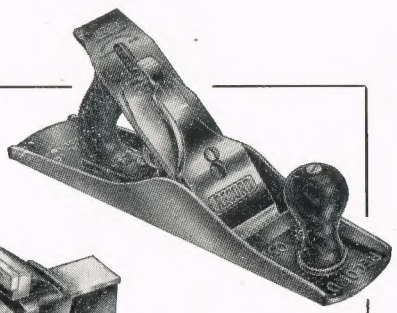

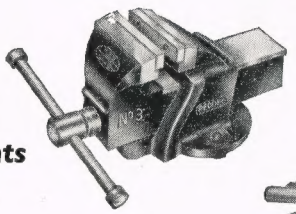

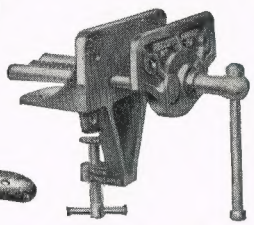

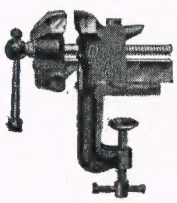

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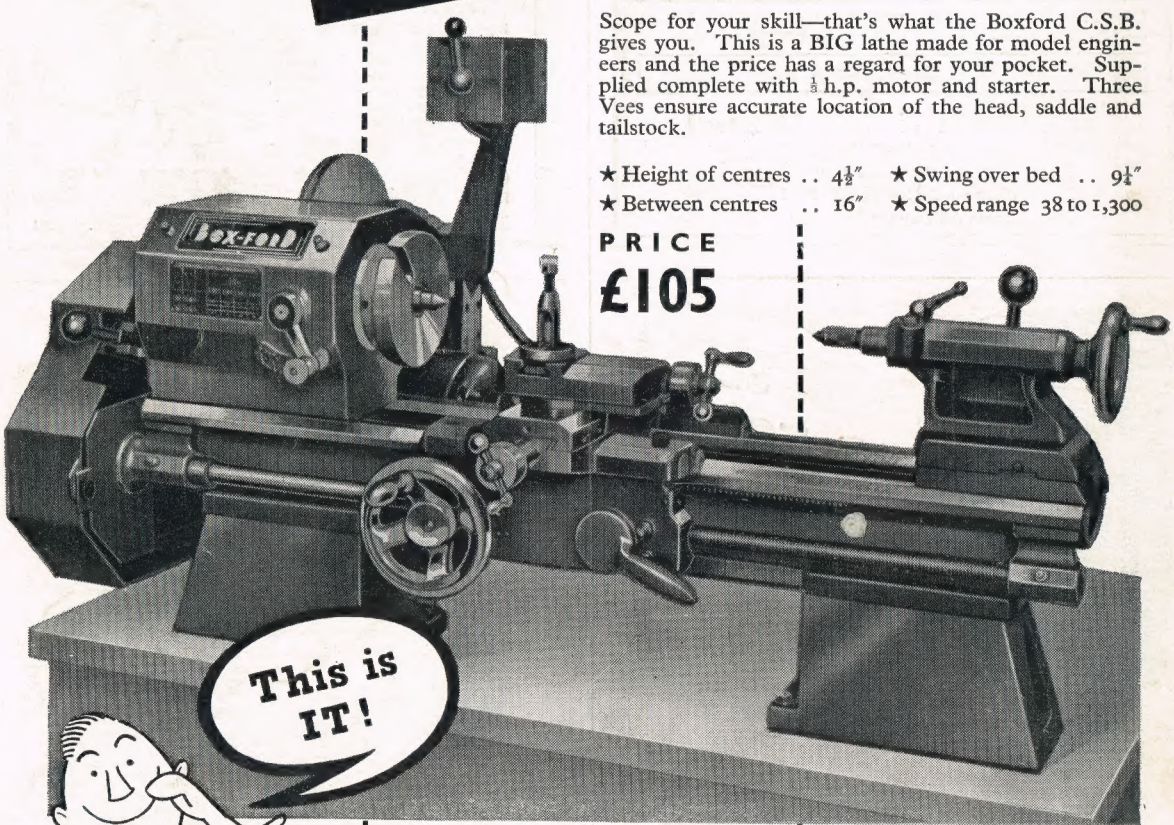

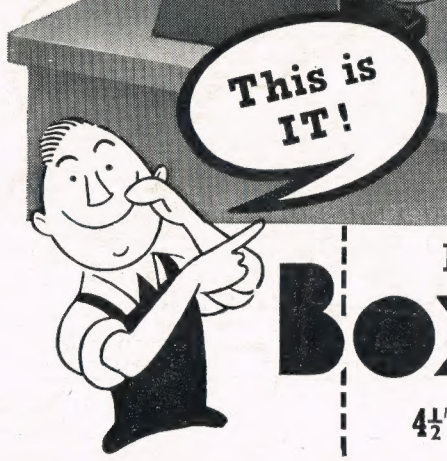

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